I begin my comments by challenging the statement in the Summary on page S3, last paragraph, line 1 of SDEIS Volume 1: “All action alternatives to the proposed action are consistent with the Forest Plan.” The evidence I offer (below) in support of this challenge comes from data and analyses published in multiple peer-reviewed journal articles on the Prince of Wales (POW) flying squirrel (Glaucomys sabrinus griseifrons) cited below and a blind peer reviewed completion report (attached) and a similar paper recently accepted for publication with an international peer-reviewed journal regarding contributions of TLMP to breeding season habitat for the northern goshawk (Accipiter gentilis) in southeast Alaska. The basis of this challenge is that the Forest Plan is supposed provide sufficient habitat to maintain viable and well-distributed wildlife populations, with special consideration of endemic small mammals (Appendix N; USDA Forest Service 1997) and the sensitive Queen Charlotte goshawk (Chapter 4; USDA Forest Service 1997). Below, I present findings that support the conclusions that existing habitat and landscape condition do not support 1) functionally connected populations of POW flying squirrels without which viable populations will unlikely persists on north POW; nor 2) sufficient nesting and foraging habitat for northern goshawk breeding pairs.

POW flying squirrel

Smith and Nichols (2003) and Smith et al. (2005) demonstrated that productive old-growth forest (POG) is the primary habitat of the POW flying squirrel. Although squirrels do occur in non-commercial forests these habitats are sinks and do not support breeding populations. Managed habitats (i.e., recent clearcuts and second-growth) do not support flying squirrel populations and empirical evidence indicates that regenerating forest patches ≤40 yrs. old are selected against at the broader scale (Shanley et al. 2012); flying squirrels rarely even use those habitats (Smith 2012). Thus, across managed landscapes POG is the only cover type that supports breeding populations of POW flying squirrels. Habitat patches require ≥73% old-growth forest cover or a minimum total area of 73 ha (170 acres) of old-growth forest to be even occupied by flying squirrels (Shanley et al. 2012). To sustain isolated breeding populations for an extended period (50 years) with a high probability (0.95), old-growth reserves need to be over 5000 ha (12,500 acres) and comprised of 100% POG; the existing small OGRs (designed for flying squirrels; USDA Forest Service 1997) have about an 80% probability of supporting flying squirrel populations for 50 years (Smith and Person 2007). Smith and Person also reported that flying squirrels were not captured in a 40-ha (100 acre) patch of POG on Kosciusko Island that was surrounded by managed forest (≤40 years), whereas a similar amount of effort captured several squirrels in a nearby large (several thousand acres) POG patch. The proposed Big Thorne project area (and except for Honker Divide, all of north POW) is highly fragmented with few (if any) large (>10,000 acres) patches of 100% POG habitat. Thus, there are few (if any) OGRs or any POG habitat
patches (except Honker Divide) in the Big Thorne Project area (and all of north POW) that likely can support POW flying squirrel populations in isolation (Smith et al. 2011). Any further logging of POG will further reduce the size of existing POG habitat patches, further fragment the landscape, and thus increase the risk of extinction in managed watersheds across north POW.

Because of their findings, Smith and Person (2007) concluded that POW flying squirrel populations across north POW need to be functionally connected (matrix is permeable to dispersal) to ensure viable populations in managed landscapes. However, several studies demonstrated that flying squirrels are unlikely to move through young second growth because they cannot perceive POG (while in second growth) beyond 50 m from the POG forest edge (Flaherty et al. 2008), and food availability in managed habitats is significantly less than POG (Flaherty et al. 2010a). Also, POW flying squirrels are unable to move efficiently and safely through managed habitats because the forest structure does not allow them to use their primary mode of locomotion (Scheibe et al. 2006), it costs flying squirrels more than twice the energy to run than glide (Flaherty et al. 2010b), and flying squirrels experience more predator attacks in managed habitats (most in clearcuts) than POG (Smith 2012). An experimental study demonstrated that it takes POW flying squirrels 10 X more time to move through clearcuts than POG (Smith et al. 2011), increasing the time 10-fold in which they are exposed to higher predator attacks and require more food to offset higher energy costs of transportation in habitats with less food (Flaherty et al. 2010a,b). The result of all of this is that young squirrels have a very low probability of natal dispersal in managed landscapes of north POW and more than 50% of the POG habitat patches (OGRs, stream and shoreline buffers, OG LUD, etc.) are not functionally connected (Smith et al. 2011). The proposed actions in the Big Thorne Project will further fragment and isolate POG patches and POW flying squirrel populations, all of which will increase the risk of extinction in managed watersheds of north POW. Moreover, because of obligate or facultative symbiotic relationships between POW flying squirrels and multiple members of its forest community (Smith 2012), significant biodiversity is also at risk.

Northern Flying Squirrel References (chronological)

Smith, W. P.  2012. Flying squirrel demography varies between island


**Queen Charlotte goshawk**

The Queen Charlotte goshawk (Accipiter gentilis laingi) is an endemic subspecies that lives in the temperate rainforest archipelagos of Southeast Alaska and coastal British Columbia (AOU 1957). The British Columbia Distinct Population Segment (DPS) was recently listed as a threatened DPS in Canada under the Endangered Species Act (Federal Register 2012). According to the status review associated with this listing, the Queen Charlotte goshawk (QCG) population is considered a meta-population of subpopulations occurring among the islands of British Columbia and Alexander Archipelagos and the mainland of Southeast Alaska south of the international border between Mount Foster and Mount Fairweather (USFWS 2007). However, based on an analysis of birds in this region Webster (1998) concluded the northern limit of the range of QGC was Baranof Island and the southern limit of Taku Inlet. Nevertheless, the viability of QGC hinges on maintaining as many (if not all) of the existing subpopulations (USFWS 2007, Federal Register 2012).

Prince of Wales Island represents the largest amount of contiguous habitat available in the Alexander Archipelagos and may be the largest amount of contiguous habitat for QCG in the United States (Webster 1988). Therefore, maintaining sufficient habitat to support a QCG breeding population on POW is fundamental to maintaining the viability of the QCG. The proposed actions under the Big Thorne Project will **further reduce essential habitat** available to breeding QCG on POW **beyond the 33% watershed harvesting thresholds** stipulated in the **Forest Plan**, and more importantly, beyond levels that are recommended to sustain viable and well-distributed populations across managed watersheds of the island, thus increasing the risk of extinction of the QGC subspecies (Reynolds et al. 1992, Smith, In Revision). Below, I detail my rationale with the support of empirical data and analyses (Smith and Goldstein 2006, Smith, In Revision).

The Big Thorne Project proposes to protect all existing and new goshawk nests discovered during implementation of the selected action alternative. However, QCG on POW are not limited by nest trees or nest areas (sensu Reynolds et al. 1992) and successful breeding is dependent on habitat elements that also provide food and protection (Reynolds et al. 1992, McClaren et al. 2005). The pattern of numerous previously occupied nest areas being abandoned by QCG following timber sale projects (Titus et al. 1994, Flatten et al. 2001) underscores the futility of just protecting nest areas as a conservation measure. Furthermore, a widely acknowledged life history pattern in western North America is that breeding home ranges of northern goshawks are comprised of **three**
**hierarchical biological components** (Reynolds et al. 1992, Kennedy et al. 1994, Andersen et al. 2005, McClaren et al. 2005), **all of which need to be considered simultaneously in land-use planning or mitigation** (Northern Goshawk *Accipiter gentilis laingi* Recovery Team 2008): 1) nest area; 2) post-fledging (family) (PFA); and 3) foraging area. Nest areas provide alternate nest trees, roost trees, and prey plucking posts, and serves as centers of essential breeding behaviors or life history events, such as adult courtship and fledgling movements during the post-fledging period (Reynolds et al. 1992). PFAs surround active nest trees and represent the core-use area of an adult female and the area young goshawks use after fledging and before becoming independent of adults and dispersing (Kennedy et al. 1994). McClaren et al. (2005) suggested the biological role of PFAs and nest areas are similar and thus it is useful to consider them as one functional component. Regardless, the habitat composition (i.e., overstory) of PFAs should be similar to nest areas (Reynolds et al. 2008). Foraging areas comprise the majority of northern goshawk breeding home range size and are especially important for adults providing food to young and for dispersing juveniles.

At the request and with the financial and personnel support of the Tongass National Forest, Smith and Goldstein (2006) undertook a spatially explicit analysis of the contributions of the Tongass conservation strategy elements (USDA Forest Service 1997) to QCG breeding season habitat. Because the nest protection provision (i.e., buffer surrounding each nest tree) of 40 ha (100 acres) prescribed under forest wide S&Gs represented approximately the size of a nest area, this analysis focused on the other two biological components: PFA and foraging areas using a database of known nest sites and published ecological data from southeast Alaska (Iverson et al. 1996). This analysis examined the composition of habitat types and the composition of landuse designations (LUDs) in hypothetical (virtual) PFAs and foraging areas surrounding the 136 nest trees, the areas of which was determined according to QCG movements in Southeast Alaska (Iverson et al. 1996). Only 30% of nest trees had >51% of PFAs in preferred habitat; 55% had >51% in unsecure LUDs, whereas 16% had >51% in a protected old-growth forest LUD. Foraging area composition was similar to PFAs, but proportion predominantly (>75%) available for development or with 26-50% of total area in preferred habitat were larger than PFAs, and half as many nests had >51% of area in preferred habitat. Among covertypes, preferred habitat averaged 39.4% of the PFA. The methods and results of this analysis can be found in the attached completion report previously provided to the Alaska Region. These findings increase uncertainty about conservation measures contributing sufficient habitat to sustain well-distributed, viable populations of northern goshawks throughout Southeast Alaska (Smith, In Revision). Below, I discuss in detail why further logging of north POW will further reduce essential habitat for breeding QCG and increase the risk of extirpation of the POW subpopulation of QCG, which ultimately increases the risk of extinction of the already threatened DPS (USFWS 2007).
Standards and guidelines prescribed for individual nest trees in Southeast Alaska (40 ha) are unlikely to meet breeding season habitat objectives established for northern goshawk populations in the southern portion of its range (Reynolds et al. 1992). The expectation that, in intensively managed landscapes, preferred habitat contributed by other elements of the TLMP conservation strategy (e.g., old-growth reserves, riparian or shoreline buffers) will mitigate this deficiency was not supported by a spatially explicit analysis of 136 virtual PFAs. An ideal northern goshawk home range consists entirely of older forests with small, dispersed openings (Reynolds et al. 2008). Guidelines for the composition of PFAs stipulate that “the majority (60%)” of a PFA should be in forest of older age classes (Reynolds et al. 1992:23). Nest areas in Southeast Alaska averaged 71% productive old growth; 58% of the nest area was comprised of preferred habitat. Before logging, landscapes likely were similar in composition to nest areas, although a disproportionate amount of high and very high volume old-growth was clearcut during the three decades preceding the 1997 TLMP revision, especially on Prince of Wales and other southern islands (USDA Forest Service 1997). In this study, only about a third of 136 virtual PFAs contained >51% preferred habitat. More importantly, the average composition of ‘unsecure’ (i.e., Development or NNF LUDs) habitat was 55%, and 60% of all PFAs were comprised of >51% unsecure habitat. Regardless of whether I compare the results of this study to habitat guidelines from the southwestern US or to the composition of Southeast Alaska nest areas (i.e., desired future condition of goshawk PFAs; Reynolds et al. 2008), the observed PFA habitat composition was less than the minimum recommended or desired amount of suitable habitat.

At the time of the summary assessment of the conservation strategy (USDA Forest Service 1997), about 5% (35/678) of the watersheds exceeded a stipulated threshold, with 33 – 47% of productive old-growth forests already harvested; 26 of those (74%) are concentrated in one Biogeographic Province (North Prince of Wales Island). Moreover, full implementation of the Forest Plan would result in 51 watersheds with >47% of the productive old-growth harvested, 29 of which would occur in the North Prince of Wales Island Province. The summary assessment acknowledged the higher risks of exceeding watershed thresholds, especially across North Prince of Wales Island, but assumed that large reserves in those landscapes would mitigate the habitat loss from excessive timber harvest. The findings of this study suggest that contributions of habitat reserves and other conservation elements might not compensate for cumulative habitat loss in intensively managed landscapes. Similar conclusions were obtained for managed landscapes across another large island comprised of coastal temperate rainforest (Northern Goshawk Accipiter gentilis laingi Recovery Team 2008). Extensive loss of habitat from clearcut logging on Vancouver Island, British Columbia evidently contributed to population declines; perceived threats to habitat and concerns over population viability led to a review by the U.S. Fish and Wildlife Service (2007) and listing of the Queen Charlotte goshawk DSP as Threatened under ESA (Federal Register 2012) and by the Committee on the Status of Endangered Wildlife in Canada (Northern Goshawk Accipiter gentilis...
laiingi Recovery Team 2008). Prince of Wales Island is near the northern limit of
the range of the Queen Charlotte subspecies and represents a significant portion
of its available habitat in the United States (U.S. Fish and Wildlife Service, 2007;
Northern Goshawk Accipiter gentilis laingi Recovery Team 2008).

The threshold composition of suitable habitat to ensure successful breeding on
POW Island is unknown. To gain this knowledge requires extensive research that
chronicles reproductive histories of individual breeding pairs and links fitness to
nesting habitat condition (Salafsky et al. 2007). The opportunity to compile
demographic data for Southeast Alaska is remote because nest monitoring has
been discontinued. Alternatively, biologists, policy makers, land managers, and
researchers often rely on habitat selection as the basis for assigning habitat
quality; i.e., conditions that facilitate successful reproduction (e.g., Reynolds et al.
1992; Iverson et al. 1996). Based on a similar rationale, the findings of this study
increase uncertainty that northern goshawk breeding season habitat objectives
are being met in managed landscapes of Southeast Alaska. Two lines of
reasoning support this conclusion.

First, spatially explicit analyses of contributions to northern goshawk breeding
season habitat revealed that TLMP conservation measures contribute about half
the secure habitat recommended for PFAs of breeding pairs in the southern
portion of this species range (Reynolds et al. 1992) and was less than half the
relative amount of preferred habitat documented in nest areas in Southeast
Alaska. A similar conclusion was obtained for the broader landscape (21 km²)
surrounding each nest. This is because much of the preferred habitat across the
landscape has been clearcut logged and half the remaining preferred habitat is in
Development LUDs available for timber harvest. The potential for second-growth
stands to become useable habitat (mature second growth) over the TLMP
planning horizon is limited because unmanaged second growth typically requires
≥300 years following disturbance to develop old-forest features (Nowacki and
Kramer 1998). Active management can hasten the development of old-forest
condition, but pre- and commercial thinning has occurred in only about 30% of
267,000 ha that has been harvested across the region (Barbour et al. 2005).
Although it is unlikely that all of the available old-growth forest in Development
LUDs will be harvested during the planning period, substantial preferred habitat
can be reduced because a disproportional amount of future harvest likely will
occur in portions of the landscape with larger tracts near existing roads (i.e.,
cumulative impacts) such as the proposed Big Thorne Project, which increase
the economic viability of timber sales. Furthermore, full implementation of TLMP
would exceed stipulated harvest thresholds of 33% by ≥33% (>47%) within 29
watersheds in the North Prince of Wales Island Province, thereby increasing
viability risk across a significant portion of the QCG range in Southeast Alaska
(USDA Forest Service 1997; Appendix N40; U.S. Fish and Wildlife Service
2007). Regardless, the average composition of all preferred habitat in PFAs
(39%) is well below the recommended or desired condition, even if another acre
is not harvested (Smith, In Revision, Smith and Goldstein 2006).
Secondly, there appears to be sufficient justification to question whether guidelines developed for northern goshawk populations in the southwestern United States underestimate habitat needed by breeding pairs in managed landscapes of Southeast Alaska. A critical consideration in conserving habitat to support breeding populations is sufficient habitat to sustain prey resources (Salafsky et al. 2007). Despite possible differences in life history or ecology across the range of northern goshawks, the nesting and foraging habitat of successful breeding pairs **must support adequate prey**. Reynolds et al. (1992:23) recommended that older forest in PFAs be distributed among 3 age classes, with “20% each in mid-age (ca. 140 yr.), mature (ca. 200 yr.) and old (240 yr.) trees” to provide for a diversity of prey. In Southeast Alaska, the most important (frequency and biomass) prey during the breeding season (Lewis et al. 2006) are bird and mammal species that are most abundant, or occur exclusively, in productive old-growth forests (Iverson et al. 1996, Russell 1999, Smith et al. 2001, Smith et al. 2004, 2005). Consider further that the mammal fauna of Southeast Alaska is depauperate (MacDonald and Cook 1996); few mammal species exclusively occur in low volume or managed forests of Southeast Alaska (Smith et al. 2001, Smith and Nichols 2004); and the structure of managed stands effectively renders prey unavailable to foraging goshawks. Avian communities in managed habitats include few if any additional prey for northern goshawks (Smith et al. 2001). Thus, breeding pairs in managed landscapes of Southeast Alaska likely rely almost entirely on productive old-growth forests as foraging and nesting habitat. That breeding pairs in managed landscapes of Southeast Alaska depend on productive old-growth forests to meet life history needs is reflected in the findings of compositional analyses and radio-telemetry studies, both of which determined that northern goshawks strongly preferred medium and high volume old-growth forests and avoided recently managed or non-forested habitats (Iverson et al. 1996).

**Queen Charlotte Goshawk References (alphabetical)**


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