Petition
to
Correct Information Disseminated
by the
USDA Forest Service
(GTR-RM-217)

January 17, 2003

Petition Elements

This Petition (Request for Correction) is a formal request for the correction of information disseminated by the USDA Forest Service, and it is submitted under:

1. Public Law 106-554 § 515

2. OMB Guidelines for Ensuring and Maximizing the Quality, Objectivity, Utility, and Integrity of Information Disseminated by Federal Agencies

3. USDA's Information Quality Guidelines

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Description of Information to Correct

Management Recommendations for the Northern Goshawk
in the Southwestern United States
General Technical Report RM-217
August 1992
United States Department of Agriculture
Forest Service
Rocky Mountain Forest and Range Experiment Station
Fort Collins, Colorado 80526

GTR-RM-217 may be cited as:

Reynolds, R. T.; Graham, R. T.; Reiser, M. H.; Basset, R. L.; Kennedy, P. L.; Boyce, D. A., Jr.; Goodwin, G.; Smith, R.; Fisher, E. L. 1992. Management recommendations for the northern goshawk in the southwestern United States. Gen. Tech. Rep. GTR-RM-217. Fort Collins, CO: U.S. Department of Agriculture, Rocky Mountain Forest and Range Experiment Station. 90 p.

Date of dissemination to Requestor(s): March 25, 2002

Current dissemination status: available and actively distributed. See http://www.fs.fed.us/rm/main/pubs/notsohot_RM/wild_RM.html.

Provisions of Public Law 106-554 § 515 are applicable to an agency's disseminated information as described in the OMB Quality Guidelines, paragraph III.4 (see Appendix 6, this petition):

> III.4. The Agency's pre-dissemination review, under paragraph III.2, shall apply to information that the agency first disseminates on or after October 1, 2002. The agency's administrative mechanisms, under paragraph III.3., shall apply to information that the agency disseminates on or after October 1, 2001, regardless of when the agency first disseminated the information.

The OMB directive, including dates for adherence, is consistent with congressional intent as embodied in Public Law 106-554 § 515:

> (a) In General.--The Director of the Office of Management and Budget shall, by not later than September 30, 2001, and with public and Federal agency involvement, issue guidelines under sections 3504(d)(1) and 3516 of title 44, United States Code, that provide policy and procedural guidance to Federal agencies for ensuring and maximizing the quality, objectivity, utility, and integrity of information (including statistical information) disseminated by Federal agencies in fulfillment of the purposes and provisions of chapter 35 of title 44, United States Code, commonly referred to as the Paperwork Reduction Act.

Because GTR-RM-217 has been disseminated by the USDA Forest Service on or after October 1, 2001, the document is subject to requests for corrections under Public Law 106-554 § 515. Also, additional documents,

currently disseminated, explicitly cite, access and are dependent upon the quality of GTR-RM-217, in whole or in part. Several such documents are listed below, and because of the dependence on GTR-RM-217, further qualify GTR-RM-217 for requests for corrections.

The documents listed below are not the subject of this petition, and are offered only to support the requestors' contention that GTR-RM-217 is eligible for correction requests under Public Law 106-554 § 515. However, because of the dependency of the listed documents on GTR-RM-217, separate requests for corrections (petitions) are being submitted. These separate petitions are included with this petition because information contained herein is directly relevant to and support the additional requests for corrections.

ADDITIONAL USDA FOREST SERVICE INFORMATION, currently disseminated, that explicitly cite, access and are dependent on the quality of GTR-RM-217, in whole or in part:

1. Record of Decision for Amendment of Forest Plans - Arizona and New Mexico. United States Department of Agriculture, Forest Service, Southwestern Region.

Decision signed by Charles W. Cartwright, Jr., Regional Forester, Southwestern Region, USDA Forest Service, June 5, 1996.

A formal copy of the Record of Decision was disseminated to the requestor(s) on September 18, 2002 by the USDA Forest Service, Kaibab National Forest, Williams, Arizona.

2. General Technical Report PNW-GTR-387. 1996. Conservation Assessment for the Northern Goshawk in Southeast Alaska.

PNW-GTR-387 may be cited as:

Iverson, George C.; Hayward, Gregory D.; Titus, Kimberly; DeGayner, Eugene; Lowell, Richard E.; Crocker-Bedford, D. Coleman; Schempf, Philip F.; Lindell, John. 1996. Conservation assessment for the northern goshawk in southeast Alaska. Gen. Tech. Rep. PNW-GTR-387. Portland, OR: U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station. 101 p. (Shaw, Charles G., III, tech. coord.; Conservation and resource assessments for the Tongass land management plan revision).

A formal copy of PNW-GTR-387 was disseminated to the requestor(s) by the USDA Forest Service, Pacific Northwest Research Station, Portland, Oregon, and received on March 25, 2002.

3. Expert Interview Summary for the Black Hills National Forest Land and Resource Management Plan Amendment.

The expert interview summary is currently disseminated on the Internet at:

http://www.fs.fed.us/r2/blackhills/fp/planning/99Amend/00_10_25_ExpertInterviewSum.pdf

4. Black Hills National Forest - Phase I Goshawk Analysis

The Phase I Goshawk Analysis is currently disseminated on the Internet at:

http://www.fs.fed.us/r2/blackhills/fp/planning/99Amend/00_12_20_GoshawkAnalysis.pdf

ADDITIONAL ELEMENTS are included in this petition under USDA procedures.

These additional elements are included in this petition as follows. This petition is divided into eleven topical sections, numbered I-XI. In each section, a specific issue in GTR-RM-217 is described and discussed. Included with each section are the following elements:

1. Explanation of substandard quality issues, with supporting documentary evidence.

2. Explanation of noncompliance with OMB and/or USDA Information Quality Guidelines.

3. Explanation of the Effect of the Alleged Error

In section XII, technical reviews of the GTR-RM-217 draft manuscript are discussed. The final element, "Recommendation and Justification for How the Information Should be Corrected", is located in Section XIII.

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Introduction

Under the provisions of (1) Public Law 106-554 § 515, (2) OMB Guidelines for Ensuring and Maximizing the Quality, Objectivity, Utility, and Integrity of Information Disseminated by Federal Agencies, and (3) USDA's Information Quality Guidelines, the purpose of this petition is to request the withdrawal (retraction) of GTR-RM-217. The petitioners (requestors) will show that multiple information quality violations and errors exist throughout GTR-RM-217, and the demonstrated violations and errors are of such substantial significance and magnitude that corrections alone are inadequate, and withdrawal is the only appropriate remedy.

USDA quality guidelines for regulatory information apply to RM-217 because the document has been used in a manner identified as being subject to them:

> "Information that is subject to the guidelines under this section includes the following:
>
> "Scientific analyses (meaning natural science - plant pathology, animal physiology, etc.) and risk assessments prepared in support of agency rulemaking efforts."
>
> "Any other substantive analyses, documents, procedures prepared in support of agency rulemaking activities or enforcement."
>
> - USDA Information Quality Guidelines for Regulatory Information, p. 1
>
> http://www.ocio.usda.gov/irm/qui_guide/policy.html

RM-217 has been incorporated, as a scientific analysis and in support of agency rulemaking efforts, into the Forest Plans of National Forests in Region 3, in the "Record of Decision for Amendment of Forest Plans - Arizona and New Mexico", dated June 5, 1996.

Petition Format

For brevity, Public Law 106-554 § 515 may be referred to herein as the Federal Data Quality Act, or FDQA.

The Requestors may also be referred to herein as the Petitioners.

The subject publication, GTR-RM-217, shall be referred to as RM-217.

The USFS Region 3 Northern Goshawk Scientific Committee shall be referred to as GSC.

All literature citations printed in standard type refer to references listed in RM-217 and reprinted in Appendix 1 of this petition.

All literature citations printed in **bold** type refer to references not listed in RM-217, and said references are listed in Appendix 2 of this petition.

Primary FDQA violations are explained in eleven topical sections, numbered I-XI. Subsections are used to present and discuss primary elements of each topic. Appendices provide additional supporting information. Following each section, specific FDQA violations are explained in the elements "Explanation of noncompliance with OMB and/or USDA Information Quality Guidelines" and "Explanation of the Effect of the Alleged Error".

Section XIII includes the petition element "Recommendation and Justification for How the Information Should be Corrected".

Where numbered, quoted passages are ordered sequentially within the containing section.

Petition Topics

I. Nest area size, quantity and stand structure

1. Explanation of substandard quality issues, with supporting documentary evidence.

The required nest area size in RM-217 originated with a substandard reference that offered only speculation in support of a nest stand area of 20 to 25 acres in size. The GSC incrementally inflated this speculative value to finally include 6 nest areas, each 30 acres in area, or 180 acres total, and it did so by misrepresenting cited literature and/or without providing substantive explanations.

Nest area size determination is inaccurate and unclear

Goshawk nest area size is specified as 30 acres in RM-217, pp. 3, 6, 7, and 22. No supporting documentation or explanation is provided. On RM-217 p. 13, nest areas are defined as follows:

(1) "Boundaries of nest areas were determined by observing the behavior of the adults, the movements and behavior of newly fledged young, and the locations of prey plucking areas and roosts (Reynolds et al. 1982). The size (20-25 acres) and shape of nest areas depend on topography and the availability of patches of dense, large trees (Reynolds 1983)."

No explanation or supporting documentation was given for the arbitrary increase in nest area size from the cited 20-25 acres in passage (1), to 30 acres elsewhere in RM-217.

In the second sentence of passage (1), the RM-217 citation to Reynolds (1983) is a secondary citation - Reynolds (1983) is not the original source of nest area size, and instead the reader is referred to the work of Reynolds et al. (1982) as the source of the 20-25 acre value.[1] Further, in the original source (Reynolds et al. 1982), the authors, in discussion at the end of the paper, "suggest that forest stands" of 8 ha (20 acres) be left intact for goshawks - without the benefit of presented and supporting data. A review of the two publications shows that a reader could, at best, surmise with caution that perhaps a nest stand is 1.6 acres in size. See Appendix 3, section A3.13.1 for a detailed review of passage (1).

The stated nest area size in RM-217, be it 20-25 acres or 30 acres, is not adequately supported by cited references or empirical data.

[1] Statements utilizing citations are expected to be supported by the literature to which the reader is referred. Secondary citations seriously degrade the quality of a publication. See Appendix 3 of this petition for further discussion.

2. Explanation of noncompliance with OMB and/or USDA Information Quality Guidelines.

OMB Guidelines: The RM-217 specification of nest area size fails to meet objectivity requirements as defined in V.3.a. The stated nest area sizes of 20-25 acres, and 30 acres, are not accompanied with an accurate presentation of underlying information. The supporting reference (for 20-25 acres) is a secondary citation, and the RM-217 statement is therefore not clear. RM-217 also violates objectivity standards for substance as defined in V.3.b: the original and supporting data is not properly presented for the 30-acre and 20-25 acre nest area size specifications. It was shown above that such data does not exist, and therefore there could be no analytic results and no opportunity to use sound statistical and research methods. The information is not presented in an accurate, clear and complete manner.

The RM-217 passage also fails to meet the reproducibility requirement as defined in V.10 because the references, as described above and in Appendix 3, section A3.13.1, do not provide adequate information to support the stated nest area size, or to successfully reconstruct how the stated nest area size was determined.

USDA Information Quality Guidelines for Scientific Research Information: As demonstrated above, utility, transparency and reproducibility requirements are violated. Specifically, the 20-25 acre and 30 acre nest area size passages are unreliable, inaccurate and unclear. RM-217 fails to adequately explain how nest area size was determined, and further fails to explain the limitations or reservations that should be applied when using the information.

3. Explanation of the Effect of the Alleged Error

The error harms the requestors by causing incorrect and inflated nest site areas to be implemented as a component of forest management on federal lands administered by the U.S. Forest Service. Because the nest site area is a nest tree "buffer", the most restrictive management limitations are placed on nest areas (RM-217 pp. 6,7,13,14,21-22). Nest stand stocking is required in RM-217 to be carried at high levels that reduce individual tree growth (RM-217 Table 5, p. 14) and, in fact, required minimum nest stand attributes are not attainable (see Section VII, this petition). Therefore, the unsubstantiated and incorrect inflation of nest area size reduces opportunities to actively manage forests in a manner that produces quality timber products, improves forest health, reduces fire hazard and improves wildlife habitat. Reduced timber harvests negatively impact local and regional economies, causing harm to communities and the forest products sector, and hence to the requestors. Increased management costs associated with errant large nest areas decrease financial returns to the U.S. Forest Service, requiring increased costs to be passed to taxpayers that fund the agency. The requestors pay federal taxes and/or represent others that do.

Number of nest areas per nesting pair was arbitrarily inflated

In RM-217, the number of nest areas per nesting pair was specified as:

1. "two to four alternate nest areas" (p. 3, uncited)
2. three suitable and three replacement (p. 6, uncited)
3. three suitable and three replacement (p. 7, Table 2, uncited)
4. "Many pairs of goshawks have two to four alternate nest areas within their home range." (p. 13, uncited)
5. "3 suitable and 3 replacement" (p. 22, uncited)

Selected literature listed in the "References" of RM-217 (pp. 35-48) and cited elsewhere in RM-217 was reviewed for this petition to determine which other authors/papers discussed alternate nest areas, including:

Meng (1959)
Schuster (1980)
Reynolds et al. (1982)
Reynolds (1983)
Reynolds and Meslow (1984)
Crocker-Bedford and Chaney (1988)
Kennedy (1988)
Hayward and Escano (1989)
Kennedy (1989)
Patla (1989)
Reynolds (1989)
Kennedy (1990)

The following statements were made concerning alternate nests:

(2) "The extent (if any) that Northern Goshawks build alternate nests is not known..." (Shuster 1980, p. 89).

(3) "Many nests were active every other year, which indicated that many pairs of goshawks usually alternated between two nests. Some pairs maintained four nests within their nesting territories. No nest was ever used in consecutive years." (Crocker-Bedford and Chaney 1988, p. 212.)

"The results indicated that all pairs of goshawks alternated between at least two nests, and some pairs had four nests available. Although alternate nests occasionally occurred in the same nesting stand, most alternate nests were located within two stands or occasionally three stands within 1 km of each other. These results suggest that good nesting habitat should include three potential nesting stands..." (Crocker-Bedford and Chaney 1988, p. 216.)

The authors did not explain methods or other details to support their nest utilization statements.

(4) "Goshawks commonly used the same nests for many years, or alternated between two or more nests within a site. Many goshawks and a few Cooper's hawks irregularly used alternate nest sites. Of the three species, the goshawk showed the greatest site fidelity. For example, it was not uncommon for pairs to occupy a single nest site for 5 or more years, and one particular site was still active 10 years after its discovery." (Reynolds 1983, p. 4)

Reynolds (1983, p. 6) speculated in discussion that in addition to two potentially active nest sites, a pair of replacement nest sites would be an appropriate management goal:

(5) "Goshawk pairs also should be provided two potentially active and two replacement nest sites." (Reynolds 1983)

(6) "To reduce the loss of nesting habitat, managers need to identify existing nesting stands and, based on appropriate topography and projected vegetation structure, locate future nesting stands and withdraw these from planned treatments. Reynolds (1983) and Kennedy (1988) present the sizes of uncut areas to leave around active and potential nesting stands and Reynolds (1983) discusses the number and dispersion of nesting areas required to maintain the accipiters' nesting populations." (Reynolds 1989, p. 98)

(7) "Because new Accipiter nests were located every year in the Jemez Mountains and all nests were not monitored every season, it is difficult to quantify the annual site occupancy rates." (Kennedy 1989, p. 9.)

Kennedy also made management recommendations for northern goshawks, and made no further mention of alternate nest areas.

Though Reynolds et al. (1982) had an important opportunity to do so, no mention was made of alternative nest sites for goshawks on p. 137:

(8) "On the basis of the area used by the nesting adults, and later, the fledged young, we suggest that forest stands on 4, 6, and 8 ha be left intact around sharp-shinned, Cooper's, and goshawk nests, respectively. Furthermore, because of tree growth and associated changes in the vegetative spructure [sic] of aging nest sites, management of sharp-shinned and Cooper's hawk populations must account for a turnover of nest sites. That is, because nest sites contain the appropriate vegetative structure for a limited number of years, stands, with the appropriate topography and the developing vegetation need to be identified as future sites. Future nest sites should not be precommercially or commercially thinned, as thinning will result in stands with reduced tree densities, deeper crowns, and less abundant roosts and nest materials. To maintain existing densities of Accipiter populations in Oregon, nest sites should be provided at densities and dispersions similar to those reported by Reynolds and Wight (1978)." [*End of paper*.]

In RM-217, these statements were not cited or discussed for any of the five opportunities to do so (numbered 1-5 at the start of this subsection, above).

(Note that the terms "nest site", "nest stand", and "nest area" must be interpreted within the context defined by respective authors.)

It is not clear how alternate nest usage, as described in the RM-217 references but not explicitly cited, was accounted for.

The number of required goshawk nest areas started as being unknown in passage (2) by Shuster (1980); continued as unworthy of mentioning in Reynolds et al. (1982); was revised to single nest use with some alternation between two or more sites with many goshawks irregularly using alternate nests, including a particular emphasis on goshawk site fidelity in passage (4) from Reynolds (1983, p. 4), being then further revised in Reynolds (1983, p. 6) in passage (5) to four nest sites without supporting data even though Reynolds (1983) was largely based on the work of Reynolds et al. (1982); then, Kennedy (1988) never mentioned alternate goshawk nests in her study or ending discussion of management recommendations, even though her work was cited in Reynolds (1989) in passage (6), and since Reynolds (1989) was a literature review and effectively a "status of our knowledge" presentation, the paper offers no apparent original research, and must therefore rely completely in passage (6) on Reynolds (1983) for authoritative support on the need for alternate nest sites - and Reynolds (1983) offered only speculation without supporting data as discussed earlier in this paragraph. Therefore, Reynolds (1989) offers no insight or meaningful support for nest area quantity needs. Kennedy (1989) could offer only advice on practical field difficulties and the subsequent inability to quantify site occupancy in passage (7) and never again discusses alternate nests even though her management recommendations on p. 16 are specified as being based on Reynolds (1983). However, Crocker-Bedford and Chaney (1988) were able to suggest with narrative observations in passage (3) that "Many nests were active every other year", which of course "indicated that *many* pairs of goshawks *usually* alternated between two nests" [emphasis added], and further, "Some pairs maintained four nests within their nesting territories". Importantly, Crocker-Bedford and Chaney (1988) offered additional insight in passage (3) - "Although alternate nests *occasionally* occurred in the same nesting stand, *most* alternate nests were located within two stands or *occasionally* three stands within 1 km of each other. These results *suggest* that good nesting habitat should include *three* potential nesting stands..." [emphasis added].

The extent of the data provided by Crocker Bedford and Chaney (1988) in support of their observations and conclusions follows (p. 211):

(9) "Of 85 goshawk nests analyzed for nest activity during the year they were first located, 45% were in use. Of 41 nests monitored for activity one year after they were located, 32% were in use. Of 32 nests monitored for activity two years after they were located, 28% were in use. Of 19 nests analyzed for activity three years after they were located, but before any nearby harvesting, 26% were in use."

They did not explain why the quantity of monitored nests decreased each year, nor how they accounted for the increase in unmonitored nests in their alternate nests discussion.

On p. 20, Patla (1989) described efforts to locate alternate nests, and the uncertainty experienced is evident:

> (10) Assumed alternate nests were located at four of the nine active stands, ranging from 18' (5m) to 4000' (1220m) distance from the active nest tree with an average of 1530' or 466 meters. At sites where no alternative nests were found, it was thought that they could be located at greater distances than that searched. At other historic territories, Sheep Creek (D-l) and Long Gulch (D-4) (not measured), alternate nests were found spaced between 100-200' along the base of ridges on the same elevation contours as the original nest. At Rocky Canyon (D-4), an assumed alternate nest was located in an adjacent drainage above the Snake River at approximately the same elevation and position within the drainage as the active nest had been found.

In 1992, in RM-217, the final recommendation is that three suitable and three replacement nest areas (RM-217, p. 22, and Table 2, p. 7) must be identified and retained for each goshawk pair, a recommendation made without the benefit of supporting citations, discussion or empirical evidence from the information available among the included references.

Conclusion: for the five possible locations within RM-217 where conflicting suitable and replacement nest areas and utilization levels were posited, none were offered in a context of supporting data or references. A review of RM-217 references reveals there is no agreement among authors, other than little is known about goshawk nest site utilization, and qualitative observations suggest a goshawk pair may alternate between two nest sites, and perhaps more, or use the same nest for 5 or even 10 years. The GSC had no basis for requiring three suitable and three replacement nest areas, and it might well have recommended 2 suitable sites and zero replacements per goshawk pair based on available references.

No data was offered to indicate 3 or more areas per goshawk pair, suitable or replacement, would be beneficial to goshawk populations.

2. Explanation of noncompliance with OMB and/or USDA Information Quality Guidelines.

OMB Guidelines: The RM-217 passages specifying the need for, and number of, goshawk nest areas per nesting pair on pages 3, 6, 7, 13 and 22 fail to meet objectivity requirements as defined in V.3.a for presentation of information. The stated and recommended nest area quantities are not accurate and do not reflect the inherent uncertainty and poorly substantiated statements in available references. The RM-217 statements are contradictory and therefore are not clear. The RM-217 passage also fails to meet the reproducibility requirement as defined in V.10 because the references, though not explicitly cited as should have been the case, do not provide adequate information to support the stated nest area quantities, or to successfully reconstruct how the stated nest area quantities were determined.

In addition, under V.3.b, the RM-217 stated recommendation requiring a total of six nest areas be maintained per goshawk pair is not reliable in substance because original and supporting data, and analytic results, were not produced using sound statistical and research methods.

USDA Information Quality Guidelines for Regulatory Information: The failure to present and discuss readily available and contradictory literature is a violation of USDA quality guidelines for regulatory information, where agencies and office should "ensure transparency of the analysis by... providing good documentation of data sources, methodology, assumptions, limitations, uncertainty, computations, and constraints."

3. Explanation of the Effect of the Alleged Error

The error causes the number of required nest areas to be inflated, without substantive cause or corroborating data. The effect is to arbitrarily increase the number of nest areas required for each goshawk nesting pair on public forest lands administered by the U.S. Forest Service. Arbitrarily increased nest area quantities increase the extent and impacts of nest stands that are used as buffers requiring the most restrictive limits on forest management activities, and the harm to the requestors as described above for nest site size are further increased in magnitude.

The cumulative impact of these data quality violations (for nest area size and number of nest areas) is to force federal forest managers to identify more and larger nest areas, subject to the most restrictive operational limitations, than what a prudent review, discussion and presentation of available literature otherwise suggests. For example, conservatively, it could readily be argued that each goshawk nesting pair requires only 1.6 acres per nest stand (refer to Appendix 3, section A3.13.1 of this petition), and two nest areas total, or 3.2 acres to be identified and subject to the most restrictive forest management limitations - and only this scenario is supported, though weakly, by references in RM-217. Less conservatively, but significantly less grounded in corroborating data, two potentially active nest areas, and two replacement nest areas, each 19.6 acres in size, could have been specified by the GSC, for a total of 76 acres. Instead, the GSC chose to specify as a requirement, without adequate explanation or corroborating data, that 6 nest areas 30 acres in size, or 180 acres total, must be provided and maintained for each goshawk nesting pair in the Southwest.

Nest stand structure

Even-aged goshawk nest area and nest stand structure is recommended in RM-217. No documentation was offered to support this requirement. All references are inadequate for empirical determination of nest stand structure. Four cited references provide diameter distributions for sampled nest sites and strongly contradict RM-217.

In the RM-217 glossary on p. 88, nest stands are defined as "the stand of trees that contains the nest tree", and nest areas are "the nest tree and stand(s) surrounding the nest that contain prey handling areas, perches, and roosts". The preferred silvicultural treatments on RM-217 p. 22 are specified for nest areas, and also on p. 22, nest area "stand structure" is described by the minimum required parameters listed in RM-217 Table 5 for nest stands.

In RM-217, nest areas and nest stands are discussed and treated identically in regard to forest structure. The nest area/nest stand terminology was presumably developed to encompass stands or portions of stands as delineated on the ground that could not be expected to coincide with nest area boundaries as defined by the GSC. The terms "nest area" and "nest stands" are therefore interchangeable in regard to discussion of stand structure, i.e., stand structure (even-aged or uneven-aged) and minimum structural attributes (RM-217 Table 5, p. 14) are the same for nest areas and nest stands. The term "nest stand" will be used for stand structure discussion in this subsection, but concepts presented also apply to nest areas.

Referring to RM-217 Table 5 on p. 14, the desired forest conditions for nest stands include stand structure mandates of 100% VSS 5 and 100% VSS 6. This is mathematically impossible in both theory and practice. None-the-less, the VSS 5/VSS 6 specification for nest stands is an even-aged directive.

On RM-217 p. 22, the preferred and thus prescribed silvicultural treatments for suitable nest areas and replacement nest areas are "thin unwanted understory trees" and "thin from below", respectively. On RM-217 p. 23, Fig. 10 is a diagram showing even-aged management as attained through "thinning from below" over time, and the figure is referred to on RM-217 p. 22 for managed development of replacement nest areas.

In other words, according to RM-217, the management system specified for nest stands is even-aged management, but this was not found to have been explicitly stated by the GSC. The circuitous manner in which this is declared in RM-217 is cumbersome and unclear, even though the following is stated on RM-217 p. 13 with the first sentence in the section titled "Nest Area":

"Nest areas are easily identified by their unique vegetation structure."

No explanation or contextual references are offered to explain how the preferred silvicultural treatment methods were selected, nor why even-aged structure was selected and preferably recommended for nest stands.

Further, no explanation or contextual references are offered to precisely explain how the required stand VSS values (5 and 6) were determined, including nest area discussion on RM-217 pp. 13, 15 and 21-22.

For this petition, a hypothetical diameter distribution was created that meets basic minimum RM-217 nest stand stocking requirements specified in Table 5 (RM-217 p. 14) for ponderosa pine with site index >= 55, and for (assumed) VSS requirements in Table 1 (RM-217 p. 7). The hypothetical stand is classified as VSS 6, with the majority of basal area in the VSS 6 class. The stand consists of trees in 5-inch-wide diameter classes, including 9.5 TPA (trees per acre) with DBH (diameter at breast height) = 22.5 inches; 12 TPA and DBH=27.5; 9.5 TPA and DBH=32.5. There are 31 trees per acre, and all trees are greater than 22 inches DBH. This proposed even-aged stand has 33.1 ft^2/ac in VSS 5 and 118.6 ft^2/ac in VSS 6, and a total stand basal area of 152 ft^2/ac. The hypothetical diameter distribution is graphed in Fig. 1 of this petition. The purpose of the hypothetical diameter distribution is to demonstrate the required even-aged structure of nest stands, including an even-aged diameter distribution, and to contrast the RM-217 minimum requirements with empirical diameter distributions for nest sites in RM-217 cited references.

It must be noted here that the RM-217 even-aged mandate for nest stands, including VSS requirements and preferred silvicultural treatments, encompass the specific characteristics of even-aged diameter distributions that are well understood by foresters. The requirements do not recommend or describe uneven-aged conditions in any way. The hypothetical diameter distribution described above is a typical and fair portrayal of required minimum conditions that were expected by the GSC to result from recommended silvicultural treatments in RM-217. The basis for and interpretation of RM-217 Table 5 is not straight forward. See Section VII of this petition.

Assuming the intent of the GSC was to recommend VSS 5 and VSS 6 structure for nest stands in some *combination* totaling 100%, the nest stand references listed on RM-217 p. 13 were reviewed to determine what empirical results had been presented to assist with the determination of nest stand structure in RM-217. These references are listed in Table 8. (Additional discussion of Table 8 may be reviewed in Section VII.)

Four references include sufficient data to portray stand structure at nest sites as defined by the respective authors.

Crocker-Bedford and Chaney (1988), in their Fig. 2 (p. 213), show diameter distributions for combined data from 23 ponderosa pine nest sites, and 11 mixed conifer nest sites (mislabeled as "stands" in their publication, but otherwise referred to as nest sites by the authors), each 1.2 ha (2.97 ac) in size and encompassing a nest tree, and sampled with 9 variable-radius points per nest site.

The data from Crocker-Bedford and Chaney (1988) was interpreted from their Fig. 2 and are graphed in Fig. 1 below. Their ponderosa pine and

mixed conifer nest sites are represented by uneven-aged diameter distributions. The ponderosa pine data shows a classic inverse-j distribution, and the mixed conifer stands show a lower Q-ratio or somewhat irregular uneven-aged distribution. See **Smith et al. (1997)**, Fig. 15.6.a, p. 375, and Fig. 2.2.2, p. 24. The hypothetical RM-217 nest stand is represented by the even-aged distribution shown in **Smith et al. (1997)** Fig. 2.2.1, p. 24.

Hayward and Escano (1989) present mean nest-site characteristics in their Table 1 on p. 477. The data is properly presented as coming from 0.04 ha (0.1 ac) fixed-radius plots "centered on the nest". Therefore, their sampled nest stand conditions represent only small areas, or nest sites, located at goshawk nest trees.

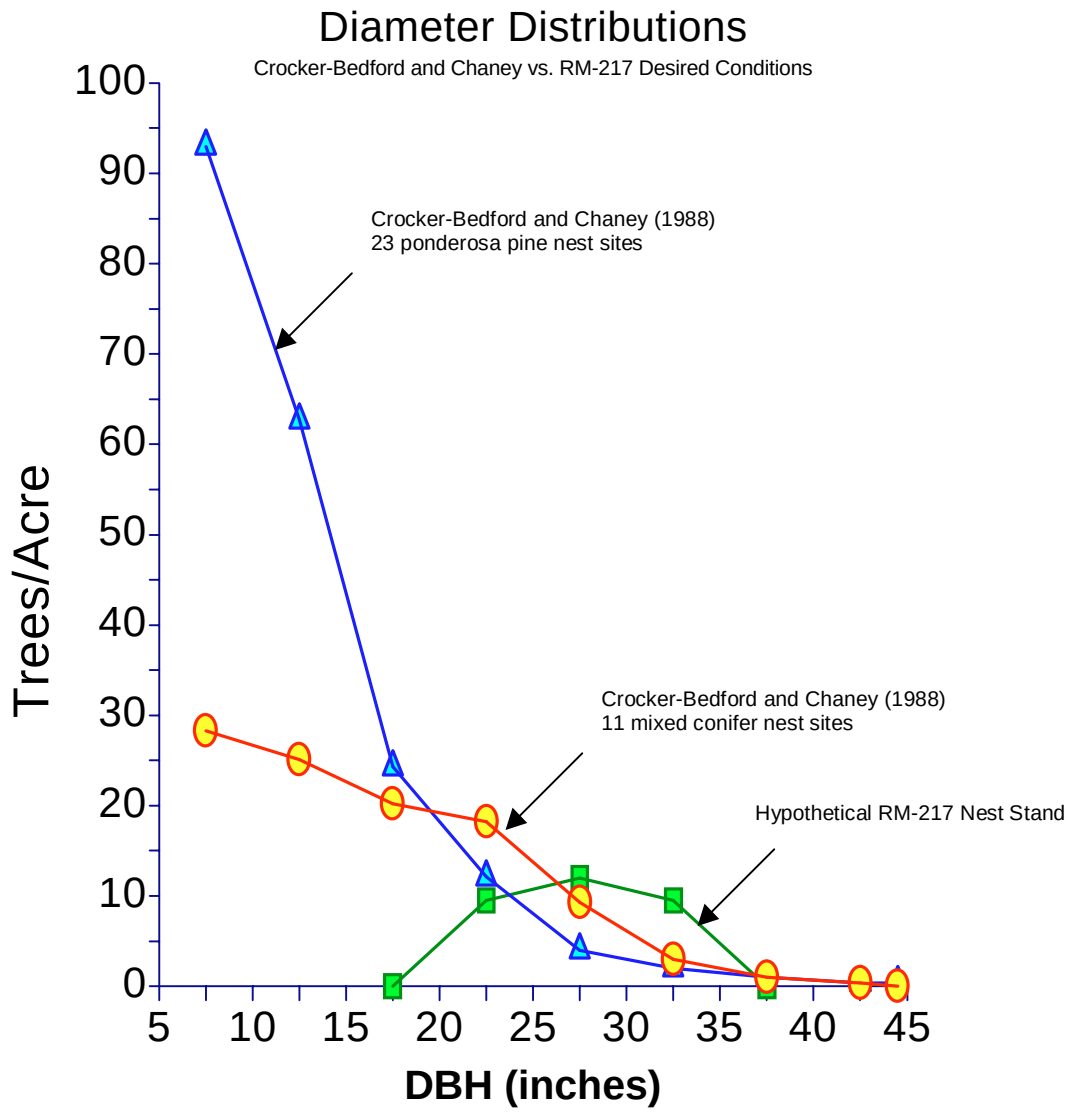

Fig. 1. Comparison of diameter distributions for RM-217 hypothetical nest stand and nest site inventory data from Crocker-Bedford and Chaney (1988).

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The mean diameter distribution for 17 nest sites and provided in four diameter classes was converted from metric units, and the diameter distribution was graphed using the midpoints of the original diameter classes. The Hayward and Escano (1989) mean diameter distributions are shown below in Fig. 2 with the diameter distribution for the hypothetical RM-217 nest stand.

Referring to Fig. 2, the Hayward and Escano (1989) mean diameter distribution for 17 nest sites is uneven-aged.

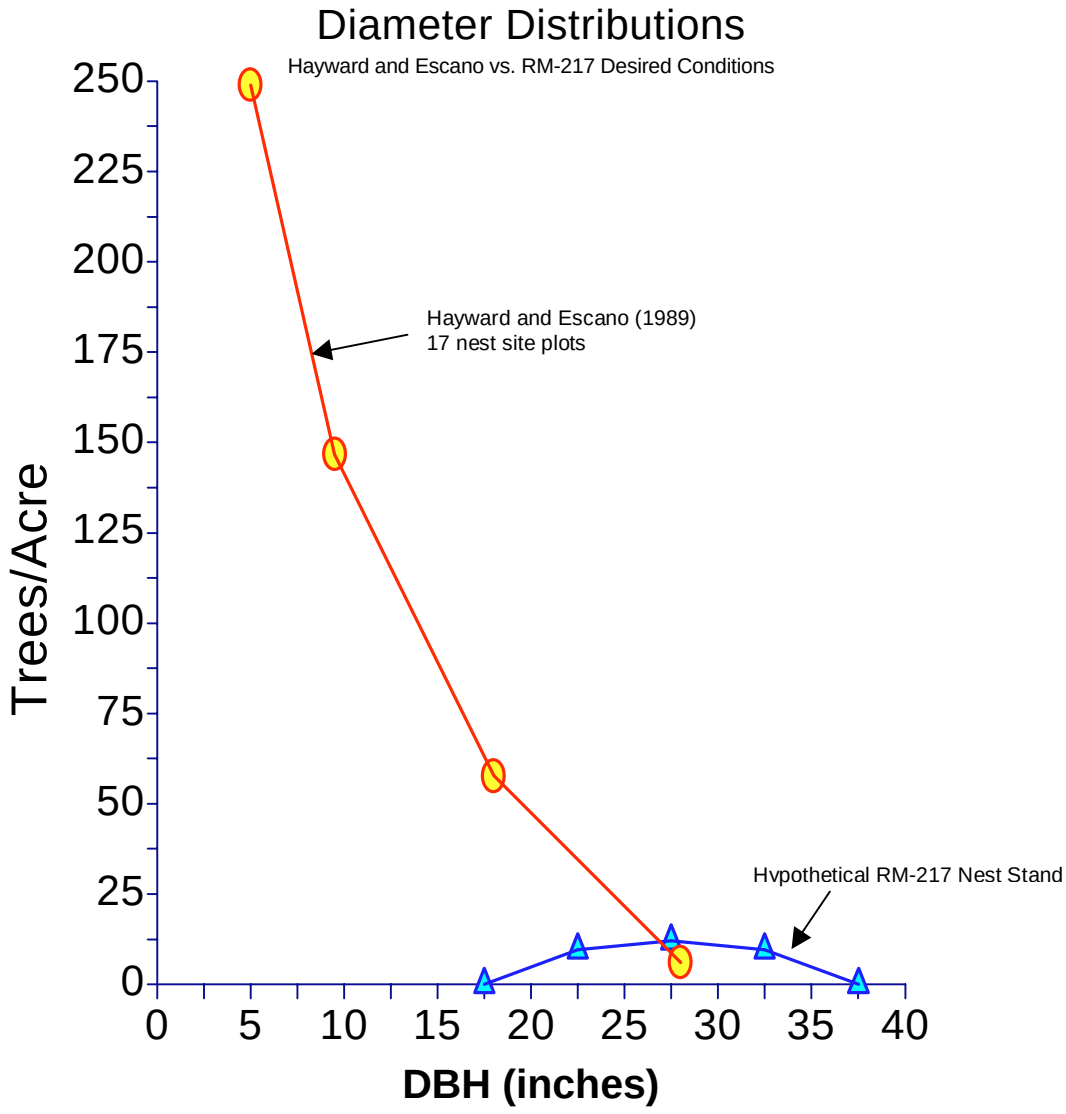

Fig. 2. Diameter distributions for hypothetical RM-217 nest stand and nest site inventory data from Hayward and Escano (1989).

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Speiser and Bosakowski (1987) show diameter distributions for 20 random plots and 13 goshawk nest site plots in New York and New Jersey. For nest sites, they sampled 0.145 ha (0.36 ac) fixed-radius plots centered on nest trees.

Mean diameter distributions were interpreted from their Fig. 2 (Speiser and Bosakowski (1987), p. 389). Diameter class and frequency data was converted from metric units and graphed in Fig. 3 with the diameter distribution for the hypothetical RM-217 nest stand.

Moore and Henny (1983) present mean goshawk nest site diameter

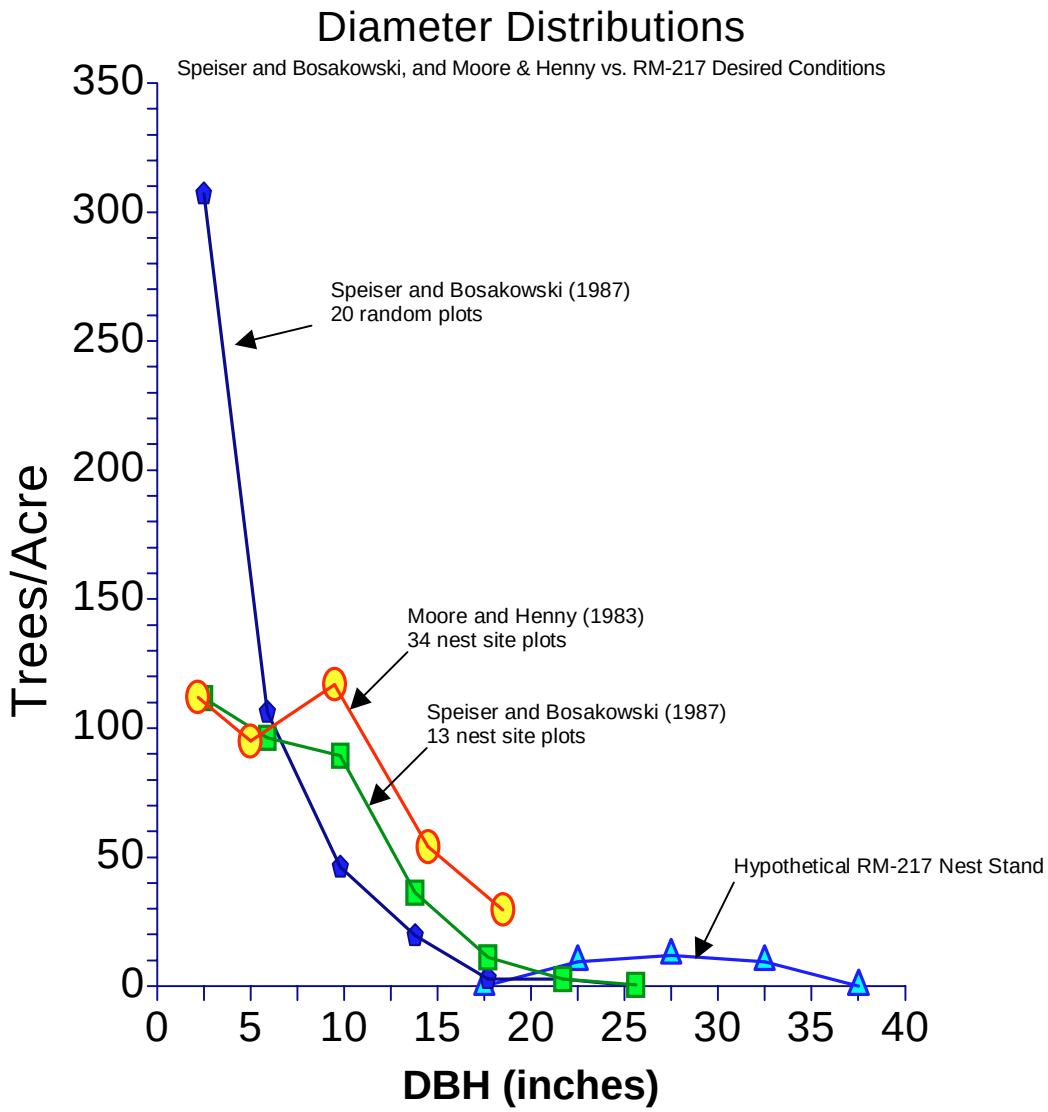

Fig. 3. Diameter distributions for hypothetical RM-217 nest stand, nest sites and random plots from Speiser and Bosakowski (1987), and nest sites from Moore and Henny (1983).

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distributions for five DBH classes from 34 0.08 ha (0.20 ac) goshawk nest site plots (Moore and Henny (1983), Table 1, p. 69). The diameter class frequency data was converted from metric units and also graphed on Fig. 3 of this petition.

Goshawk nest site diameter distributions reported by Speiser and Bosakowski (1987) and Moore and Henny (1983) both represent uneven-aged conditions, in contrast to the RM-217 nest stand requirements (Fig. 3).

For all four studies, the small sampled sites are centered on nest trees and results must not be extrapolated to nest stands. This is in part demonstrated with the diameter distribution for random plots provided by Speiser and Bosakowski (1987) in Fig. 3 above, where stocking in small diameter classes is higher than on nest site plots, and stocking on nest site plots is higher in diameter classes of 10 inches and greater. (Refer to Speiser and Bosakowski (1987) for details of statistical comparisons of the distributions.) However, stand structure is uneven-aged for both their random and nest site plots.

The required even-aged goshawk nest stand conditions and companion silvicultural/forest management recommendations in RM-217 are errant. No explanation and no references were provided to support the required even-aged structure of nest stands or recommended even-aged silvicultural treatments. References cited in support of required minimum structural attributes for nest stands either provide insufficient empirical data to portray nest stand structure, or, cited references provide empirical nest site diameter distributions representing uneven-aged conditions, in direct contradiction with RM-217 requirements.

2. Explanation of noncompliance with OMB and/or USDA Information Quality Guidelines.

OMB Guidelines: RM-217 requirements and recommendations specifying goshawk nest stands are to be maintained in an even-aged condition, or manipulated through management in replacement nest stands to achieve even-aged conditions, are incorrect, as are related silvicultural/ forest management recommendations. RM-217 therefore fails to meet objectivity requirements as defined in V.3.a for presentation of information. The stated goshawk nest stand structure requirement is not accurate and does not reflect the paucity of nest stand structure information in all reviewed references, or the presented empirical nest site structure data available in four references. RM-217 also fails to meet the reproducibility requirement as defined in V.10 because the even-aged stand structure requirement cannot be reproduced and is, in fact, refuted by RM-217 references.

In addition, under V.3.b, the RM-217 stated nest stand even-aged structure requirement is not reliable in substance because original and supporting data, and analytic results, were not produced or cited.

USDA Information Quality Guidelines for Regulatory Information: The failure to present and discuss readily available and contradictory literature is a violation of USDA quality guidelines for regulatory

information, where agencies and office should "ensure transparency of the analysis by providing good documentation of data sources, methodology, assumptions, limitations, uncertainty, computations, and constraints."

3. Explanation of the Effect of the Alleged Error

The error causes U.S. Forest Service managers to locate, delineate and place into special management status forest stands of specific structure that are incorrectly identified as suitable for goshawks. Goshawk nest stands are subject to the most stringent management restrictions. Reserved stands, as specified in RM-217, include suitable and replacement nest areas numbering six (6), each 30 acres in size, for every known goshawk pair in the southwestern United States on public forest lands administered by the U.S. Forest Service.

Stands of incorrect structure are being identified, reserved and subject to the most stringent restrictions.

The incorrect nest stand structure requirement is highly likely to contradict goshawk needs and may cause reductions in goshawk populations, negatively impacting ecosystem function and degrading the requestors' enjoyment of forest amenities on National Forests. Uneven-aged sites (and possibly stands) likely to meet goshawk habitat utilization preferences are not being identified, reserved and correctly managed and thus the required nest stand conditions in RM-217 can be expected to result in negative consequences for goshawk populations.

II. Post-fledging family areas (PFAs)

1. Explanation of substandard quality issues, with supporting documentary evidence.

PFA existence is based on bias, speculation and arbitrary procedures

The concept of the post-fledging family area (PFA) was arbitrarily created by the GSC. PFAs have no demonstrated basis in cited literature. References were misrepresented and results distorted to achieve a preconceived outcome - the expansion of buffers already offered by nest areas. Because there is no basis for the existence of PFAs, there could be no empirical or research record for either a quantitative or qualitative designation of PFA characteristics. In RM-217, all desired PFA characteristics appear to have been presented without any demonstrated basis in science or the literature record.

Post-fledging areas, or PFAs, are defined on RM-217, p. 13:

(1) "In a radio-telemetry study of the post-fledging behavior of goshawks, Kennedy (1989, 1990) described an area used by the adults and young from the time the young leave the nest until they are no longer dependent on the adults for food. This "post-fledging family area (PFA)" surrounds the nest area and, although it generally includes a variety of forest conditions, the vegetation structure resembles that found within nest stands. PFAs vary in size from 300 to 600 acres (mean = 415 acres) and may correspond to the territory (a defended area) of a pair of goshawks (Kennedy 1989). PFAs provide the young hawks with cover from predators, and sufficient prey to develop hunting skills and feed themselves in the weeks before juvenile dispersal."

The first sentence of passage (1), and the relevance of the contained citations, is discussed in detail in Appendix 3, A3.13.4.

For this petition, a review of selected literature among the listed references of RM-217 found no mention of PFAs, either by name or concept, in any papers other than Kennedy (1989 and 1990). Therefore, the entire concept of PFAs is bound by the RM-217 definition and the cited works of Kennedy (1989) and Kennedy (1990).

Kennedy (1990) is an abstract of a paper presented at a symposium sponsored by the Arizona Chapter of the Wildlife Society. The citation refers to the abstract on the last page of the proceedings. No paper exists. Submission of a manuscript, subject to review, was a prerequisite to presentation (Krausman and Smith (1990))[2]. The publication of only a simple abstract suggests that either a revised manuscript was not submitted in a timely fashion for publication, or ultimately the manuscript was rejected, without comment in the proceedings. The reason for the absence of a paper was provided by

[2] Krausman and Smith (1990), p. vi: "Each manuscript was reviewed by one or both editors and at least one reviewer."

Dr. Krausman: only an abstract was submitted (personal communication, October 9, 2002, P. Krausman.)

Thus, it is not clear that even the abstract was reviewed. Kennedy (1990) is an improper, substandard citation that is inappropriate for use in RM-217.

Kennedy (1989) is an unpublished final report that was submitted to the Santa Fe National Forest. There is no indication it was reviewed by any party prior to submission to the U.S. Forest Service.

That which in RM-217 is named a PFA was labeled a "core area" in Kennedy (1989) on p. 5:

(2) "The concept of core areas has received considerable use in the ecological literature. The idea has generally been used to denote central areas of consistent or intense use (Kaufman 1962). Conceptually, core areas have potential use as buffer areas around nest trees. However, a quantitative definition is noticeably absent. HOME RANGE identifies core areas by comparing these utilization distribution from harmonic mean calculations with a uniform use model (Samuel et al. 1985)."

Thus, Kennedy identified a need for a core area because of purported academic popularity, and the quantitative definition and corresponding algorithm was relegated to an apparent available option in the program HOME RANGE.

Continuing on Kennedy (1989) p. 14:

(3) "Core areas that include the nest (Tables 5-7) averaged 167.9 ha for female Northern Goshawks, 648.7 ha for male Northern Goshawks, 403.9 ha for female Cooper's Hawks, and 341 ha for male Cooper's Hawks. These core areas represent concentrated use areas and include, [sic] preferred hunting areas near the nest, perches, roost sites, and training areas for the fledglings. Several birds (See Figures 11 and 12 for examples) had multiple core areas. The core areas away from the nest were other preferred hunting areas or roost sites.

(4) "The females' core areas that include the nest is [sic] what I refer to as the nest stand. Previous investigaters [sic] have defined nest stands by vegetation and topographic characteristics rather than bird usage patterns (Shuster 1980; Reynolds 1983). The females' core areas include the major plucking posts, perches, and the areas used by the fledglings during the fledgling dependancy [sic] period. These are the areas that should be protected from habitat disturbance and will be the basis of the buffer zone recommendations presented in the SUMMARY AND MANAGEMENT RECOMMENDATIONS SECTION of this report."

The mean core area for female goshawks of 167.9 ha (415 ac) in passage (3) is the figure cited in RM-217 passage (1) as being the size of PFAs found by Kennedy (1989).

Kennedy (1989) provides no details that indicate precisely what parameters were used to calculate the boundaries (contours) of the

core areas. As defined in passage (3) above, "preferred hunting areas near the nest, perches, roost sites, and training areas for the fledglings" would be required attributes. No explicit indication is given in Kennedy (1989) that distances from the nest tree to these attributes were measured, nor were any means described to explain survey or other location methods to identify attribute positions, e.g., "major plucking posts, perches, and the areas used by fledglings during the fledgling dependancy [sic] period". No information was given concerning the data needed by the software program HOME RANGE to calculate the bounds or extent of the core area.

An inspection of the plotted positions and specified harmonic mean-based 75% and 95% utilization contours in Kennedy (1989) (contour plots are duplicated in Appendix 4, this petition, for her sample of 8 goshawks) suggests the algorithm used to derive core area boundaries differs little from that used to identify the outer two bounds, other than to enclose a smaller proportion of plotted positions. Notably, the core areas appear to vary in direct proportion to the 75% and 95% utilization contours, suggesting that under the definition in passage (3), "preferred hunting areas near the nest, perches, roost sites, and training areas for the fledglings" varied in area in direct proportion to home range area.

Kennedy (1989) did not provide raw location data. Thus, for and using the 8 goshawk contour plots (Appendix 4, this petition), a manual count was made of positions within the core area, and total positions plotted. The results are shown in Table 1.

Table 1. Proportion of observed goshawk locations within core areas as determined from the Kennedy (1989) utilization contour plots (see Appendix 4).

Sex	Bird #	Kennedy Fig. No.	Positions In Core Area	Total Positions	Percent in Core Area	Notes
M	1	2	32	36	89	
M	22	22	68	108	63	
M	27	26	44	71	62	
F	2	3	19	20	95	(model is poor fit)
F	3	4	24	38	63	
F	7	8	29	51	57	
F	19	20	64	116	55	
F	28	27	47	80	59	
				Overall mean	68	
				females	58	
				males	71	

The overall mean proportion of plotted locations within the core area of tracked northern goshawks is 68%. The larger area encompassed by the male core area contour versus the female core area contour is directly proportional to the larger home ranges by sex (see Kennedy (1989), Table 5). To understand how Kennedy (1989) determined the size of core areas referred to in Table 1 above and Appendix 4 (this petition), it is necessary to compare her definition with her cited reference to the program "Home Range". Repeating passage (2), from Kennedy (1989), p. 5:

(5) "The concept of core areas has received considerable use in the ecological literature. The idea has generally been used to denote central areas of consistent or intense use (Kaufman 1962). Conceptually, core areas have potential use as buffer areas around nest trees. However, a quantitative definition is noticeably absent. HOME RANGE identifies core areas by comparing the utilization distribution from harmonic mean calculations with a uniform use model (Samuel et al. 1985)."

Samuel et al. (1985) is a manual for the software program "Home Range". On p. 3, core area is discussed as follows:

(6) "The concept of core areas has received considerable use in the ecological literature. The idea has generally been used to denote central areas of consistent or intense use (Kaufmann 1962:170). However, a quantitative definition is noticably [sic] absent. Core areas in the HOME RANGE program are defined as the maximum area where the observed utilization distribution (based on harmonic values) exceeds a uniform utilization distribution. The uniform distribution is used as the null model since it indicates a lack of preference for areas within the home range. A Kolmogorov test (D+, p=0.05) is used to determine if observed use is significantly greater than expected. The test is made on the ordered cumulative distribution of the observed data and the uniform model. Test criteria that correct for sample size (Stephens 1974) are used in the program. An illustration of the statistical test and further description of the methods is presented in Samuel et al. (1985)."

On **Samuel et al. (1985)** p. 13:

(7) "HOME RANGE identifies core areas by comparing the utilization distribution from harmonic mean calculations with a uniform use model (Samuel et al. 1985)."

The true novelty, importance, definition and calculation of a core area in Kennedy (1989) comes, verbatim, from passages (6) and (7) in **Samuel et al. (1985)**.

Regarding the explanation for core areas, **Samuel et al. (1985)** defined a core area to be the area on the plane of the uniform utilization distribution model, bounded by the intersection with the actual utilization distribution (conceptually an irregular 3-dimensional bell-shaped curve), and tested to determine if this centralized area of utilization was statistically significant compared to uniform use. On **Samuel et al. (1985)** p. 18, the flag variable that sets the option to calculate a core area is given:

(8) "Col 13 '1' To plot core areas"

As determined from the Home Range manual, no options or additional information other than general position data may be entered for core area calculations. Therefore, the definition of PFAs in RM-217 are based on the Kennedy (1989) definition of a core area. Though precise and extravagant definitions were offered in both publications to explain the function of a PFA/female goshawk core area in passages (1) through (4) above, the true basis is from the definition in Kennedy (1989) as seen in passage (5), reproduced from **Samuel et al. (1985)** in passages (6) and (7), where a core area is defined only as the result of an arbitrary mathematical decision rule in a generalized species-nonspecific program triggered by a flag variable identified with directions for use in passage (8).

The purpose for the core area tool in **Samuel et al. (1985)** was to offer a quantitative tool in a generalized program. The simple implementation of the software flag in passage (8) may be applied as readily to grasshoppers, kangaroos or goshawks without any additional data input other than position data, because no other information or action is needed in Home Range other than to set the core area algorithm flag to 1.

These observations, combined with the paucity of procedural information supplied by Kennedy, provide sufficient reason to look closely at the PFA definition in RM-217 versus the Kennedy (1989) definition of a core area.

From passage (1) above, the first sentence of the RM-217 PFA definition is:

> "In a radio-telemetry study of the post-fledging behavior of goshawks, Kennedy (1989, 1990) described an area used by the adults and young from the time the young leave the nest until they are no longer dependent on the adults for food."

In fact, this is a poor rephrasing of Kennedy's definition in passages (3) and (4).

These attributes might indeed be included in the large female core area, but this was not because relevant and ultimately deterministic data were input into program Home Range. In passage (1) from RM-217, preferred hunting areas near the nest, perches or roost sites were not mentioned. On RM-217 p. 3, a more generic PFA definition is provided:

(9) "The PFA appears to correspond to the territory (defended area) of a goshawk pair, and represents an area of concentrated use by the family from the time the young leave the nest until they are no longer dependent on the adults for food (up to two months)."

In passage (1), additional detail in the RM-217 PFA definition was added and then attributed to Kennedy (1989):

> "PFAs vary in size from 300 to 600 acres (mean = 415 acres) and may correspond to the territory (a defended area) of a pair of goshawks (Kennedy 1989)."

In Kennedy (1989), Table 5 shows the harmonic mean estimates for core areas, and 75% and 95% utilization contours, of tracked goshawks that should correspond to areas enclosed in the contours of the Kennedy (1989) figures duplicated in Appendix 4 (this petition). The listed core area size for female goshawks ranged from 34.0 to 328.6 ha (84 to 812 ac), with a mean of 167.9 ha (415 ac). In no statement or table does Kennedy (1989) offer a range of 121 to 243 ha (300 to 600 acres) about the mean of 167.9 ha, and Kennedy's listed standard deviation of 128.5 ha does not match the RM-217 bound. The RM-217 range in PFA size from 300 to 600 acres is an undocumented interval that is not supported by Kennedy (1989).

Reviewing passages (2), (3), and (4) above, Kennedy (1989) never mentions "territory" or "defended area". However, Reynolds (1983, p. 3) described an alternative method for demarcating "nest sites":

(10) "Bartelt (1974) used a different method to determine the size of the 'nesting territory' of goshawks in South Dakota. He approached goshawk nests from various directions and noted the distance at which his approach elicited nest defense from the female. He found that the nesting territories were centered on the nests, and ranged from about 5 ha to 6 ha."

This approach, though understandably limited in defining a "defended area" relative to areas utilized by fledged young and adults, presents a stark contrast in "defended areas" of 12 to 15 acres (5 ha to 6 ha), versus the 415-acre core area specified by Kennedy (1989) and defined as the defended PFA of 300 to 600 acres in RM-217.

Portions of the RM-217 PFA definition in passage (1) were either based on speculation, or relied on the citation of Kennedy (1989) and cannot be supported by its contents. The key remaining concept derived from Kennedy (1989) was that the "core area", or PFA, averaged 415 acres in size. It follows that the reasoning behind the Kennedy core area is of utmost importance.

In passage (4) above, Kennedy (1989) arbitrarily expanded the buffer that had been traditionally defined by various authors as "nest sites", "nest stands", and, in RM-217, "nest areas". In "Summary and Management Recommendations", Kennedy (1989) explained so on p. 17:

(11) "Based on densities and reproductive success, the Northern Goshawk population in northern NM is threatened. To insure the species does not exhibit further population declines, a 648 ha (1600 acres) Northern Goshawk area should be located around active nests. This area is based on the average core area size of

> nesting male Northern Goshawks (Table 5). Within this area, a 168 ha (415 acre) core [sic] should be identified that includes the nest, favorite perches, and plucking posts. This is the core area average for female Northern Goshawks (Table 5)."

Notably, the "the areas used by the fledglings during the fledgling dependancy [sic] period" of passage (4) was omitted. Continuing from Kennedy (1989), p. 17:

(12) "No silvicultural and other land management practices that would result in a habitat change should occur in these "female" core areas. The remaining 480 ha (1185 acres) in the Northern Goshawk area could sustain limited management activities outside of the breeding season."

Therefore, Kennedy (1989) was speculating that the female core area (415 acres) should be a buffer akin to the nest areas (30 acres) in RM-217, and that limited management activities could occur beyond the female core area to the limits of the male core area (an additional 1185 acres, or 1600 minus 415). Intent was made clear in passage (4), where the following sentence was inserted between the two sentences taken from **Samuel et al. (1985)** (see passage (6) above):

> "Conceptually, core areas have potential use as buffer areas around nest trees."

In RM-217, without discussion, the nest area was effectively expanded from 30 acres to 415 acres as follows. On RM-217, p. 3:

(13) "The nest area is the center of all movements and behaviors associated with breeding from courtship through fledging."

RM-217, p. 13:

(14) "Nest areas are occupied by breeding goshawks from early March until late September, and are the focus of all movements and activities associated with nesting (Reynolds 1983). Boundaries of nest areas were determined by observing the behavior of the adults, *the movements and behavior of newly fledged young*, and the locations of prey plucking areas and roosts (Reynolds et al. 1982)." [Emphasis added.]

RM-217 proceeds to specify nest areas will be 30 acres in size. Repeating from Kennedy (1989) in passage (11) above:

(15) "Within this area, a 168 ha (415 acre) core [sic] should be identified that includes the nest, favorite perches, and plucking posts. This is the core area average for female Northern Goshawks (Table 5)."

There are no meaningful differences between the nest area as defined in RM-217 in passages (13) and (14), the "female core area" from Kennedy (1989) in passage (4), and the PFA as defined in RM-217, passage (1), after discounting enhancements incorrectly attributed to Kennedy (1989). Initially, in RM-217, this obvious arbitrary expansion of the nest area buffer function was inadvertently disclosed in passage (1):

(16) "...post-fledging family area (PFA) surrounds the nest area and, although it generally includes a variety of forest conditions, the vegetation structure *resembles that found within nest stands*" [Emphasis added.]

Considering that post-fledging areas were a new name assigned by the GSC to core areas referenced from Kennedy (1989), and that Kennedy (1989) adapted the core area concept from **Samuel et al. (1985)**, shown above to be a simple and arbitrary mathematical decision rule, independent of goshawk needs and implemented with a software flag, it was not possible for the GSC to have known what the true vegetative structure was in PFAs, let alone declare them to be similar to nest areas. The Kennedy (1989) approach was new and perhaps novel for goshawks, since in RM-217 no other work supporting the concept of 420-acre PFAs was cited.

On RM-217 p. 16, an uncited and alternative vision of PFA vegetation is offered that conflicts with passage (16):

(17) "The PFA is an intermixture of forest conditions intermediate between the high foliage volume and canopy cover of the nest stands and the more open foraging habitats."

These detailed "intermediate" conditions are specified in RM-217 on p. 6, Table 2 (p. 7), p. 13-14, p. 15-16, and p. 22-26, without supporting references. Also, the intermediate conditions give the appearance of being the GSC's interpretation of what Kennedy (1989) arbitrarily intended for the outer limits of the male core area in passage (12) to arbitrarily inflate the size of the buffer. In RM-217, this buffer from the Kennedy (1989) male core area (sample size of 3) was used to replace the initial stated PFA description in passage (16) with the undocumented goshawk vegetation needs in the PFA description of passage (17) and other page locations.

RM-217 presents the compelling appearance that PFAs were fabricated to greatly increase the size of the buffer already offered through the identification and management of 30-acre nest areas. The clear conflict between passages (16) and (17), in combination with the unusual referenced circumstances described above, further support this proposition.

The bias against active forest management and utilization, without clear evidence of either negative or positive impacts of forestry and other activities, was used in Kennedy (1989) to arbitrarily expand limited-activity buffers from small nest areas to Kennedy's

core areas, and then to PFAs in RM-217 - even though it was strongly implied in RM-217 that such an effort would be problematic:

(18) p. 9: "In spite of this, little information exists on the forest types, ages, and conditions in which goshawks prefer to hunt. Thus, for the great majority of a pair's home range, little information is available to identify and manage its habitat."

(19) p. 32: "The overall effects of forest management practices on goshawks have not been measured."

The reader is referred back to Kennedy (1989) passage (4) from above:

> "The females' core areas that include the nest is what I refer to as the nest stand... These are the areas that should be protected from habitat disturbance and will be the basis of the buffer zone recommendations..."

Clearly, Kennedy (1989) expanded nest areas by implementing the core area flag in **Samuel et al. (1985)** to expand the "no-touch" buffer already offered by nest stands. This action was taken arbitrarily, with no basis in collected and corroborating data or in supporting references, and contradicts the definition offered by Kennedy (1989). In RM-217, the GSC accepted and endorsed the Kennedy (1989) approach, enhanced the definition with a "defended area" reference incorrectly credited to Kennedy (1989), and subsequently, the GSC failed to explain the manner and circumstances used to create and define PFAs.

Therefore:

1. The existence and size of PFAs, at best, appear to be created without basis, and are poorly and improperly documented.

2. Where documented by citation, the GSC relied on the methods in Kennedy (1989), an unpublished report, and Kennedy (1990), a substandard reference.

3. PFA vegetative conditions and management recommendations are absent of supporting data or references and thus present the appearance of fabrication.

4. A careful review of the theoretical origin of PFAs suggests a clear bias was maintained and actively promoted by the GSC to aggressively limit forestry, grazing and other elements of forest utilization.

5. This bias was implemented in the absence of correctly presented and supporting documentation, and the true definition of the size and bounds of a PFA lie in the

setting of a software flag in the program Home Range to 1, to execute an arbitrary mathematical rule. This true and only valid definition of a PFA was not revealed in RM-217.

2. Explanation of noncompliance with OMB and/or USDA Information Quality Guidelines.

OMB Guidelines: Regarding PFAs and PFA desired conditions, as described above, RM-217 fails to meet the objectivity requirements as defined in V.3.a. for presentation. PFA presentation and discussion is inaccurate, unclear, incomplete and biased. In addition, RM-217 fails to meet the objectivity requirements for substance. PFA quantitative information is inaccurate, unreliable and biased. RM-217 fails to meet standards of reproducibility because the offered PFA definitions do not coincide with data offered in cited references, and the correct definition and derivation of PFA area was not explained.

USDA Information Quality Guidelines for Scientific Research Information: For PFAs, RM-217 fails to "provide an explanation that accompanies all research information detailing how it was obtained, what it is, the conditions to which it applies, and the limitations or reservations that should be applied in using the information."

USDA Information Quality Guidelines for Regulatory Information: RM-217 fails to "use pre-established criteria to evaluate data quality when using or combining data from different sources" by referencing Kennedy (1989). Further, RM-217 violates transparency requirements by failing to present a clear explanation of the theoretical basis for development of PFAs, the area of PFAs, and the development of desired PFA forest conditions. In addition, RM-217 fails to provide "good documentation of data sources, methodology, assumptions, limitations, uncertainty, computations, and constraints" in the presentation of PFA concept development, and in the quantitative origin of desired parameters for forest conditions.

3. Explanation of the Effect of the Alleged Error

The effect of the errors is the creation of a fabricated PFA management zone, subject to restrictive limitations on forest management utilization and other activities, that reduce management options on public forest lands managed by the U.S. Forest Service, reduce the level of timber production and other products and amenities, and increase the costs of U.S. Forest Service management efforts.

The errant creation of PFAs reduces opportunities to actively manage forests in a manner that produces quality timber products, improves forest health, reduces fire hazard and improves wildlife habitat. Reduced timber harvests negatively impact local and regional economies, causing harm to communities and the forest products sector, and hence to the requestors. Increased management costs passed to taxpayers that fund the agency. The requestors pay federal taxes and/or represent others that do.

III. Nest tree buffer arbitrarily increased

1. Explanation of substandard quality issues, with supporting documentary evidence.

As explained in Section II, the arbitrary creation of PFAs was incorrectly used as justification by the GSC to capriciously expand nest area buffers far beyond the 20-25 acres offered in referenced speculatory discussion reviewed in Section I. The cumulative result of inflated nest area size, nest area quantity, fabricated PFA area and desired PFA forest conditions, together, represent a significant policy mandate not adequately explained or substantiated in RM-217.

As described above in Section II, Kennedy (1989) chose to define a nest area, for the express purpose of arbitrarily expanding the buffer around nest trees, as the female core area delineated by implementation of a flag variable in the software program "Home Range". In RM-217, the Kennedy (1989) female core area was adopted to increase the size of the nest site buffer, the GSC renamed it to be a "post-fledging family area" or PFA, and subsequently fabricated desired forest conditions as presented on RM-217 pages 6, 7, 13-14, 15-16, 22-26, and other pages. The process is entirely unexplained in RM-217, and is discoverable only by detailed review as in Section II above.

The core area identified by "Home Range" includes any and all nest areas otherwise identified in RM-217, i.e., the desired PFA size of 420 acres *must include* nest area acreage because the telemetry data in Kennedy (1989) was approximately centered on the nest site and is encompassed by the core area contours for each sampled goshawk created by statistical calculations using *all* position data (see the contours on the graphs in Appendix 4, this petition) . However, on RM-217 p. 7, Table 2, the PFA designation of 420 acres is incorrectly specified as *in addition to* 180 acres reserved for six 30-acre nest areas, further increasing the nest site buffer to 600 acres from 420 acres. The GSC emphasized this increase on p. 22 for PFA Desired Conditions:

(1) "***Size***: Approximately 420 acres (not including the acres in suitable and replacement nest areas)."

This mandate is incorrect, and the result is the GSC arbitrarily and capriciously increased the effective and applied size of the nest site buffer by *excluding* nest area acreage as a PFA component that was *included* in Kennedy's female core area.

In Reynolds (1983), a reference commonly cited in RM-217, the term "core area" was used passively in the discussion of nest site management on p. 6, though the statements are not cited in RM-217. First, on Reynolds (1983) p. 6, "core area" was casually used as an

alternative term for the *center* of the home range for sharp-shinned hawks, in the discussion of nest site management:

(2) "The distance between the centers or core areas (areas containing the active, alternate, and prospective replacement sites) of the home ranges should approximate the mean distance between nests of neighboring pairs."

Thus, "core area" was presented as an *ad hoc* definition, without additional reference or explanation of utility or application. Subsequently, "core area" was used just once in Reynolds (1983) in goshawk discussion, on p. 6:

(3) "The active site and its replacement in each core area should be no farther than 0.5 km apart and not closer than 0.2 km."

The "active site" refers to the goshawk nest site. On Reynolds (1983) p. 3, the nest site was defined as follows:

(4) "Accipter 'nest sites' are defined as the forest stand containing the nest tree, including both the structural features of the vegetation (e.g., tree density, canopy closure) and the land form (e.g., slope, aspect) within an area used by a pair and their fledglings during the nesting season (Reynolds et al. 1982). Thus, the boundaries of nest sites were determined by observations of the movements of the adults and fledged young as well as the locations of prey plucking areas and roosts. Nest sites in Oregon measured in this way ranged from approximately 4 ha for sharp-shinned hawks to 6 ha for Cooper's hawks, and from 8 ha to 10 ha for goshawks."

On RM-217 p. 87, a fledgling is defined as:

(5) "**Fledgling**---A young bird that has left its nest but is unable to completely care for itself."

Thus, a young goshawk that has left its nest, unable to completely care for itself (passage (5)), requires adult attention and care within the bounds of the nest site (passage (4)), where the active, alternative and prospective nest sites are collectively within, but fledgling care area is not wholly inclusive of, the subsequently defined Reynolds (1983) core area (passages (2) and (3)).

Therefore, the Reynolds (1983) core area *includes* the three classes of nest sites (active, alternate, and prospective replacement - see passage (2)) for a goshawk pair, a direct contradiction with the RM-217 statement that PFAs are *exclusive* of nest sites (areas) in passage (1).

In addition, the nest sites defined in passage (4), collectively, encompass the total respective area required for fledgling care referred to in passage (5). Areas *beyond* nest site boundaries, but *within* the loose *ad hoc* definition of core areas of Reynolds (1983)

in passages (2) and (3), were explicitly excluded from any designation for fledgling care as a simple matter of definition. Therefore, Reynolds (1983) is in complete contradiction with RM-217 in passage (1).

Finally, the nest site boundary/fledgling care relationship, as defined and discussed in the preceding paragraphs, is in complete contradiction with the RM-217 PFA definition presented in Section II, passage (1) of this petition, and also contradicts the Kennedy (1989) female core area definition and actual implemented mathematical decision rule as discussed in detail in Section II.

In RM-217, the cumulative impact of errors described in Sections I and II, when combined with the errant PFA size requirement and definitions described above, is the creation of a goshawk nest site buffer policy that is dramatic in impact and wholly unsupported by science, be it as explained directly by the GSC or as indirectly ascertained from referenced literature.

From Section I, no corroborating data was presented or referenced to support nest sites, stands or areas of any size. It is clear from RM-217 and cited references that the GSC intended to use nest areas as nest site buffers to demarcate boundaries for the most stringent limitations on management activities and utilization. From this point, for the GSC, it was only a simple and arbitrary matter of deciding how large the buffers were to be by expanding them with PFAs, regardless of the need for supporting scientific data.

For demonstration purposes, it was suggested in Section I and Appendix 3, section A3.13.1, as an exercise, that 1.6 acres could be considered to be a possible nest area size as indirectly deduced from RM-217 cited references. It was shown in Section I that the 20-25 acre and 30 acre nest area requirements were the result of uncorroborated speculation absent of supporting data.

Therefore, tracing the errors in Sections I, II and above, the nest area buffer was arbitrarily increased from 3.2 acres (2 nest sites of 1.6 acres each) to 600 acres (3 suitable nest areas of 30 acres, 3 replacement nest areas of 30 acres, and a PFA of 420 acres exclusive of nest areas), an increase of %18,750.

The increased nest site buffer is a biased mandate. The purpose behind the increase was to expand the total area where forest management activities and other forest uses could be proffered for restrictions. This reasoning was implemented without a scientific basis and was not disclosed in RM-217.

2. Explanation of noncompliance with OMB and/or USDA Information Quality Guidelines.

OMB Guidelines: The requirement that PFA acreage be exclusive of nest area acreage is incorrect, and thus RM-217 violates the objectivity requirements as defined in V.3.a. The information presentation is inaccurate, unclear, incomplete and biased. Also violated is the objectivity requirement of V.3.b. The substance of the presented information is inaccurate, unreliable and biased.

The cumulative errors for nest area size, quantity and PFA size requirements result in the creation of a 600-acre nest site buffer, a violation of V.3.a and V.3.b as described in the previous paragraph.

USDA Guidelines for Scientific Research Information and Regulatory Information are also violated. Specifically, the increase in nest site buffer size in not transparent, is not properly documented and explained, is unreliable, unclear and biased.

3. Explanation of the Effect of the Alleged Error

The error harms the requestors by causing incorrect and inflated nest site buffers to be implemented as a component of forest management on public lands administered by the U.S. Forest Service. The nest area and PFA are, in RM-217, subject to restrictive management limitations. Therefore, the unsubstantiated and incorrect inflation of the nest site buffer reduces opportunities to actively manage forests in a manner that produces quality timber products, improves forest health, reduces fire hazard, improves wildlife habitat and accommodates recreational activities. Reduced timber harvests and limitations on recreational activities negatively impact local and regional economies, causing harm to communities and the forest products sector, and hence to the requestors. Increased management costs associated with errant large nest site buffers decrease financial returns to the U.S. Forest Service, requiring increased costs to be passed to taxpayers that fund the agency. The requestors pay federal taxes and/or represent others that do.

IV. Canopy cover

1. Explanation of substandard quality issues, with supporting documentary evidence.

Specified canopy cover definition is biased

The method described and defined in RM-217 for the measurement of canopy cover is arbitrary and absent of supporting documentation. No reviewed literature cited by the GSC to support canopy cover requirements was based on the canopy cover definition in RM-217. The result is that all RM-217 canopy cover requirements are biased and incorrect when the stated method is applied.

In RM-217, canopy cover is defined in the glossary as follows:

(1) p. 87: "**Canopy cover**--The percentage of a fixed area covered by the crowns of plants delimited by a vertical projection of the outermost perimeter of the spread of the foliage."

(2) p. 89: "**Total canopy cover**--The overall area covered by the crowns of plants delimited by a vertical projection of the outermost perimeter of the spread of the foliage in all vertical layers."

Thus, in RM-217, the field determination of canopy cover is defined as a vertical projection method. As defined in RM-217, canopy cover includes grasses, forbs, and shrubs. It will be assumed here that canopy cover is limited to tree species because the inclusion of grasses, forbs and most shrubs in standard crown measurement techniques would be extraordinary and impractical.

RM-217 statements that presented either direct canopy cover values (60%, 70%, etc.) or other cover discussion that might offer canopy cover information (e.g., "tree cover was patchy to moderately dense" on RM-217, p. 65; "correlated with canopy cover" on RM-217, p. 74; "level of canopy cover is the key element" on RM-217, p. 57), and that were accompanied with supporting citations, were identified. For this petition, as many cited references as possible were then obtained and reviewed to determine which canopy cover instruments and field procedures were used by cited authors for determination of canopy cover values. A summary of these canopy cover citations is presented below in Table 2.

Of the 14 goshawk prey species selected by the GSC, no canopy cover statements with supporting citations were made for band-tailed pigeons, chipmunks, cottontails, hairy woodpeckers, northern flickers, red-naped sapsuckers, Steller's jay, or Williamson's sapsuckers. For red squirrels, canopy cover is discussed only for cache sites. For mantled ground squirrels, one canopy cover statement is made regarding the production of fungi and readers are

then redirected to tassel-eared squirrel discussion. Only five prey species included cited canopy cover references: American robins, blue grouse, mourning doves, red squirrels and tassel-eared squirrels.

For goshawks, two canopy cover statements with supporting citations are located on RM-217, p. 13, for nest stand conditions:

(3) "Goshawk nest stands have a relatively high tree canopy cover and a high density of large trees (Bartelt 1974, McGowan 1975, Hennessy 1978, Shuster 1980, Reynolds et al. 1982, Saunders 1982, Moore and Henny 1983, Hall 1984, Speiser and Bosakowski 1987, Crocker-Bedford and Chaney 1988, Kennedy 1988, Hayward and Escano 1989)."

(4) "Information on tree height, diameter, and canopy closure of goshawk nest areas in interior ponderosa pine and mixed-species forests is provided by Reynolds et al. (1982), Moore and Henny (1983), Crocker-Bedford and Chaney (1988), Kennedy (1988),and Patla (1990)."

The canopy cover statement in passage (3) is discussed in detail in Appendix 3, A3.13.2. The relevance of cited literature in passage (4) is discussed in Appendix 3, A3.13.3.

One uncited canopy cover requirement (50%) is included for PFAs (RM-217 p. 14). Canopy cover requirements listed on RM-217, p. 7, Table 1, including areal allocation of specified canopy cover for VSS classes 4, 5 and 6, are uncited.

A total of 31 references are included in RM-217 for 35 citations in statements that either directly provided canopy cover values or presented implications or discussion regarding levels of canopy cover. Of the 31 references, 5 are Masters Theses that, to date, had not been received through Interlibrary loan and were not reviewed (from RM-217 p. 13, Bartelt (1974), Hall (1984), Hennessy (1978), Saunders (1982); from RM-217 p. 18, Uphoff (1990)). Of the remaining 26 references, 14 offer no discussion of canopy cover, and three offered brief mention of canopy cover but do not offer original research that included canopy cover measurements (see Table 2 of this petition).

The remaining 9 references do include original canopy cover research. Of these, 6 based canopy cover measurement on spherical densiometer techniques, although one, Crocker-Bedford and Chaney (1988), uses a biased extrapolation methodology that invalidates its utility and relevance (see Appendix 3, A3.13.2); two include only limited methodology discussion that therefore suggest ocular estimates were used that may be, depending on techniques, a high-variance approximation vaguely similar to readings from a densiometer; and, one reference explicitly states ocular estimates were made for canopy cover.

No cited reference used a vertical projection method for determination of canopy cover. Thus, all cited and reviewed references that explicitly describe canopy cover and measurement

methods relied on densiometers, or vaguely densiometer-like ocular estimates, for field measurements.

The vertical projection method for determination of canopy cover, as defined in RM-217, has no basis in the cited literature offered in RM-217. Since all canopy cover requirements and recommendations in RM-217 are presumed to be based on supporting citations, the vertical projection definition is incorrect and introduces severe bias into all canopy cover requirements and recommendations in RM-217.

Table 2. RM-217 canopy cover citations and instruments used in original field research. Canopy cover is abbreviated as "CC". The column labeled "CC citing page in RM-217" includes pages where statements, either directly or indirectly, refer to canopy cover and then cite the referenced paper.

Reference Name	CC Citing Page in RM-217	CC Discussed	Original CC Research	CC instrument
Bendell and Elliott 1966	56	yes	no	---
Crocker-Bedford and Chaney 1988	13	yes	yes	spherical densiometer(1)
Hall 1981	75	no	n/a	---
Hayward and Escano 1989	13	yes	yes	spherical densiometer
Hitchcock and Mirarchi 1986	66	no	no	---
Keith 1965	75	no	no	---
Kennedy 1988	13	no	no	---
Kennedy 1990	13	no	no	---
Mannan and Smith 1991	71	yes	yes	spherical densiometer
Moore and Henny 1983	13	yes	yes	spherical densiometer
Patla 1990	13	yes	yes	ocular
Patton and Vahle 1986	72	yes	yes	spherical densiometer
Patton 1975	75	yes	yes	spherical densiometer
Patton and Green 1970	75	no	n/a	---
Patton 1984	75, 76	no	n/a	---
Pederson et al. 1987	74	no	n/a	---
Preston 1946	54	no	no	---
Reynolds et al. 1982	13	yes	yes	ocular/classes/other(2)
Schroeder 1984	57	yes	no	---
Scott et al. 1977	67	no	n/a	---
Shuster 1980	13	no	n/a	---
Speiser and Bosakowski 1987	13	no	no	---
States 1985	18, 74, 75	yes	yes	ocular/classes/other(3)
States et al. 1988	18, 76	yes	no	---
Stauffer and Best 1980	53	no	n/a	---
Vahle and Patton 1983	71, 72	no	n/a	---

[1]Densiometer, extrapolated with aerial photos.
[2]Instrument not specified, ocular implied.
[3]Instrument and methods not specified, ocular implied.

Resulting canopy cover requirements and recommendations are biased

For canopy cover, application of the vertical projection technique specified in RM-217 introduces severe bias that forces forest managers to carry residual stand stocking that is approximately twice as high as any legitimate interpretation of supporting literature substantiates. As described above, the reason for the error lies in the incorrect departure the GSC made from canopy cover definitions and measurement methods used in cited references to legitimate and original research. Here, the fundamental reasons for the errant canopy cover requirements are quantitatively explained and demonstrated.

The result of the publication of errant canopy cover requirements is to force irrational, incorrect and unsubstantiated stand density mandates across the National Forests of the southwest that are directly contradictory with the forest utilization needs of goshawks. The errant requirements and recommendations mandate the implementation of nonsensical stand densities that diminish the utility and effectiveness of sound, science-based forest management practices.

Point vertical projection methods measure canopy cover in the most stringent terms - as measurements are taken, the presence or absence of tree crowns at any location other than the zenith are disregarded. The definition of canopy cover in RM-217 expands on point vertical projection to include the area of the canopy as projected vertically on the ground.

The spherical densiometer is a convex or concave mirror engraved with a grid to assist in tracking cover measurements during usage. Determination of the presence or absence of cover includes a wide viewing area at the sample point. The zenith position is a minor proportion of the entire area viewed, similar to a wide-angle or fish-eye camera lens. Depending on the precise rules used with the densiometer, openings within a tree crown (or group of trees) may be considered to be absent of canopy. An opening at the zenith position may count as 0% canopy cover using vertical projection methods, whereas the wide viewing angle on the densiometer often results in a high canopy cover reading, owing to the inclusion of the non-vertical canopy cover component, even though the zenith position may be absent of canopy cover. A similar analogy applies to the vertical projection of crown perimeters.

Because the densiometer measures a different canopy parameter than vertical projection methods, the two methods are not compatible. A densiometer will consistently produce higher relative canopy cover readings than vertical projection methods. For this reason, the methods used in supporting literature cited in RM-217 are crucial and must be respected.

Comparisons of densiometer measurements and vertical projection methods from the Kaibab National Forest are shown in Fig. 4 and Fig. 5, respectively. (Data and base graphs on file, USDA Forest Service, Rocky Mountain Experiment Station, Fort Collins, Colorado.)

In Table 5 of RM-217 (p. 14), required "**minimum** attributes" (RM-217 p. 13) are given for goshawk nest stands. For interior ponderosa pine with site index >= 55, a minimum overstory canopy cover of "60+" is required. Referring to Fig. 5 (this petition), 60% canopy cover corresponds to a basal area of approximately 189 ft^2/ac using vertical projection transects. In Fig. 4 and using a densiometer, 60% crown cover is attained, on average, at 100 ft^2/ac.

In Table 1 of RM-217, 60% canopy cover is required for 1/3 of the area in ponderosa pine forests for PFAs. As for nest stands above, there is a serious discrepancy and incompatibility between the specified vertical projection method and densiometer measurements.

Also in Table 1 of RM-217, 40% canopy cover is required for foraging areas in ponderosa pine forests. In Fig. 5 (this petition), 40% canopy cover is attained, on average and using a vertical projection method, at a minimum of 109 ft^2/ac. Using a densiometer, at least 45 ft^2/ac is required.

As seen in the above examples, minimum stand densities needed to meet RM-217 canopy cover requirements incorrectly require forest managers to attain exceedingly high levels of basal area. Relative to a densiometer, canopy cover measurements using a vertical projection method as mandated in RM-217 require attainment of stand stocking that is 89% greater for the 60% canopy cover requirement, and 142% greater for the 40% canopy cover requirement.

In Table 5 of RM-217 (p. 14), the GSC further arbitrarily, and without documentation or reference, confounded nest area canopy cover requirements by naming the attribute "overstory canopy cover", while failing to make any such differentiation in RM-217 Table 1 (p. 7). In the RM-217 glossary, the "canopy cover" definition is silent regarding an overstory modifier, and "total canopy cover" explicitly includes "all vertical layers". On RM-217 p. 88, the overstory is defined as "the uppermost canopy layer of a forest." No reference cited in regard to canopy cover, reviewed for this petition, made any such clarification in discussion of canopy cover measurement methods. In practice, it would be exceedingly difficult using any canopy cover measurement method to differentiate foliage in the "uppermost canopy layer" from other vegetative layers, and particularly in multi-storied stands. In RM-217, the canopy cover parameter is confused and unclear.

Because densiometers produce relative canopy cover values that are much higher than vertical projection methods, it is incorrect to cite research using densiometer values and then present the values as vertical projection requirements. The result of doing so, as in RM-217, is to require the achievement of extraordinarily high canopy cover using vertical projection methods with no basis in research or practical application.

The RM-217 canopy cover definition is incorrect because it differs greatly from densiometer methods employed in cited literature. It is severely biased because it uses densiometer results as targets for vertical projection methods.

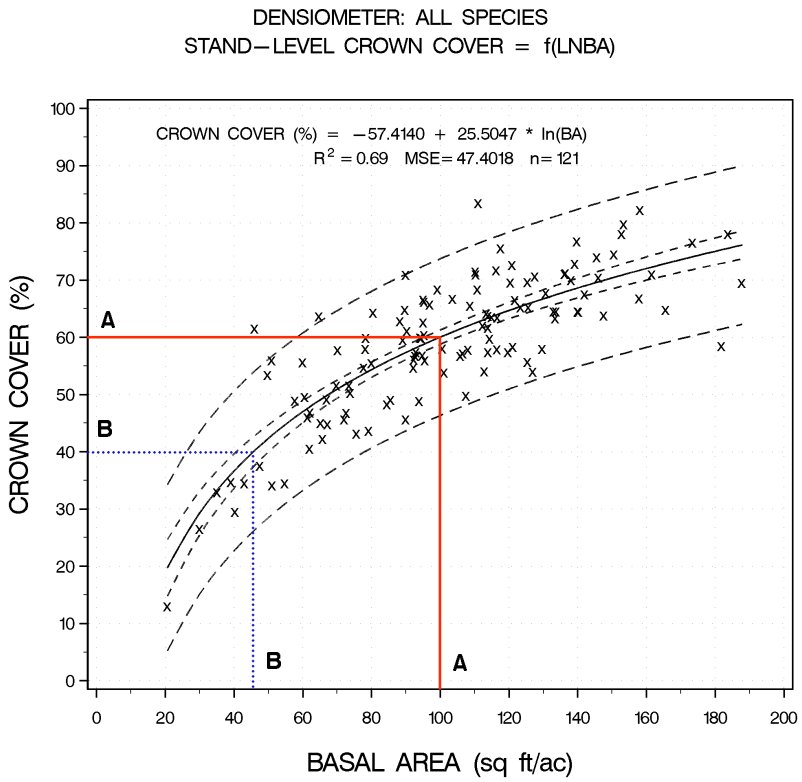

Fig. 4. Crown cover vs. basal area, densiometer.

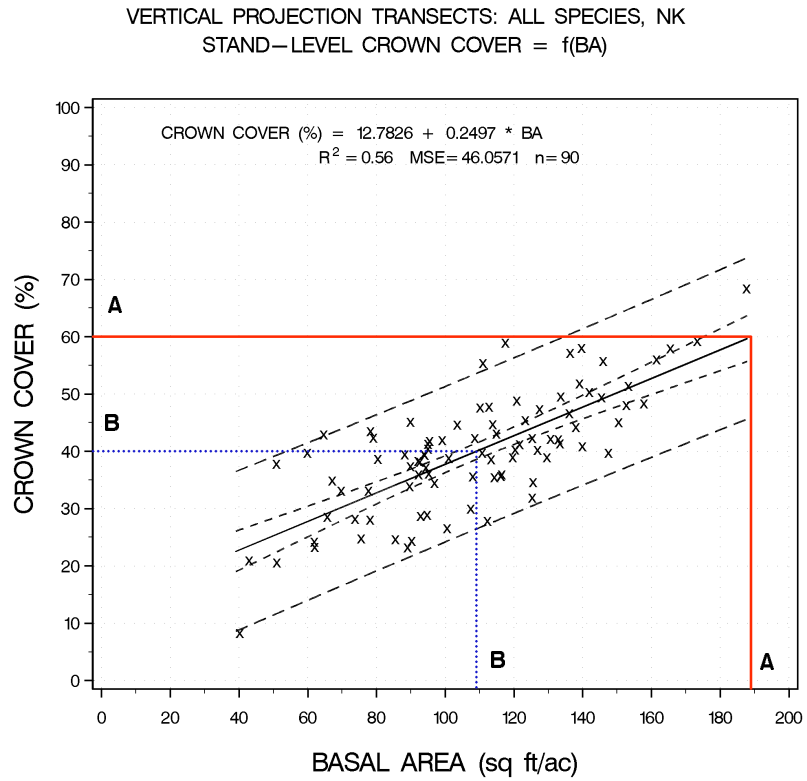

Fig. 5. Crown cover vs. basal area, vertical projection transect.

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2. Explanation of noncompliance with OMB and/or USDA Information Quality Guidelines.

OMB Guidelines: Canopy cover requirements, recommendations and discussion in RM-217, as described above, violate the objectivity requirements for presentation as defined in V.3.a, and for substance, as defined in V.3.b. The presentation of canopy cover is inaccurate, unclear, incomplete and biased; the substance is inaccurate, unreliable and biased. Further, the information presented cannot be substantially reproduced, as defined in V.10, and the development of canopy cover requirements in RM-217 is not transparent.

3. Explanation of the Effect of the Alleged Error

The effect of the errors is to require U.S. Forest Service forest managers to target exceedingly high forest stand stocking levels in attempts to meet the incorrect canopy cover requirements. Therefore, high and incorrect canopy cover/stand stocking level targets reduce opportunities to actively manage forests in a manner that produces quality timber products, improves forest health, reduces fire hazard, improves wildlife habitat and accommodates recreational activities. Reduced timber harvests and limitations on recreational activities negatively impact local and regional economies, causing harm to communities and the forest products sector, and hence to the requestors. Increased management costs associated with errant canopy cover requirements decrease financial returns to the U.S. Forest Service, requiring increased costs to be passed to taxpayers that fund the agency. The requestors pay federal taxes and/or represent others that do.

Further, the resultant canopy cover requirements in RM-217 are likely to contradict goshawk needs and preferences. Retention of errant high canopy cover levels may cause reductions in goshawk populations, negatively impact ecosystem function, and degrade the requestors' enjoyment of forest amenities on National Forests.

V. Goshawk prey species and desired foraging area conditions

1. Explanation of substandard quality issues, with supporting documentary evidence.

Qualitative decision models used to develop desired forest conditions for foraging areas are not accompanied with fundamental explanations necessary to understand and reproduce outcomes. An analysis of decision model outcomes and cited supporting references shows that the process is flawed and was likely designed to produce desired, a priori results.

Qualitative decision models are not transparent

The "Synthesis of Desired Forest Conditions" for post-fledging areas and foraging areas (RM-217, p. 15-19) relies on a process described as "gleaning" and "synthesizing" from cited literature (RM-217, p. 4, 9, 15). Information gained from the literature was incorporated into qualitative decision models represented by Table 6 (RM-217, p. 17) and Table 7 (RM-217, p. 19).

For these tables, qualitative ratings are quantitatively scored by summing or counting the importance weights for each species and attribute of interest. Results are given at the bottom of each table.

Though the results were certainly subject to interpretation, there is no explanation for how the results were evaluated and integrated into the "Synthesis of Desired Forest Conditions", p. 15-19, and "Management Recommendations for the Home Range", p. 21-30. In addition, the process used to select exactly 14 goshawk prey species from the 66 identified (RM-217, pp. 51-52) is unexplained and thus not transparent.

Qualitative decision models are biased

The process used to identify important goshawk prey species and desired forest conditions purported to enhance prey habitat is described by the GSC as having been achieved through a "gleaning" and "synthesis" of cited literature. The lack of an adequate explanation of the qualitative methods used implies that transparency was avoided, and a reconstruction of GSC decision models is impossible. However, a review of the results of their process reveals that their methods and resultant conclusions were strongly biased. Prey species, eaten or not and alleged to favor mature and overmature forest stand conditions, were selected and unduly weighted, while prey species favoring less mature, intermediate and open forest conditions were either de-emphasized or excluded from the list of important prey species. GSC conclusions for desired forest conditions, particularly in foraging areas

relative to goshawk prey habitat, are summarized on RM-217 p. 19: "Goshawk foraging habitat will have sustainable and abundant prey when the majority of forests are in older age classes." In fact, this conclusion was drawn from a biased and qualitative process sorely lacking in transparency, and their conclusion was instead a preconceived, desired outcome supported only by unexplained and faulty decision models.

In RM-217 Table 6 ("Importance of special habitat attributes for maintaining sustainable populations of selected northern goshawk prey", RM-217, p. 17) and RM-217 Table 7 ("Desired forest conditions within northern goshawk home ranges that contribute to various population levels of selected prey", RM-217, p. 19), qualitative ratings are assigned to each of 14 goshawk prey species for selected attributes of interest. These qualitative decision models, or decision maps, require adherence to certain assumptions when evaluating possible results.

In a discussion of decision model structure, **Galotti (2002)** describes the need to weigh the factors included in a decision map (p. 50):

> "In structuring a decision, there needs to be a means for decision makers to indicate the importance of each aspect or factor."

In Tables 6 and 7 of RM-217, the summation or counting of qualitative rankings for various parameters of interest are interpreted as the collective importance of habitat attributes and desired forest conditions for goshawk prey species and, hence, goshawk management. The clear assumption is that each of the 14 selected prey species are of equal importance to goshawks - the default but unspecified importance weight assigned to each is equal to 1. If all species have equal weight, then the quantitative representation for each species will be considered to be of equal influence in the decision model. If the influence of each species is to be unequal, there should be a stated reason and acknowledged methodology for the unequal weighting.

However, because the seven attributes in Table 6, and 16 attributes in Table 7, are tallied at the bottom of each table, and results across attributes were collectively contrasted, the total importance weight of any one species is the sum of the weighting across attributes for the species, times the default goshawk prey species importance weight of 1. That is, a quantitative representation of the qualitative assignments across attributes in Tables 6 and 7 represents the true importance weight assigned to each of the individual 14 prey species. If each prey species is to be weighted equally, than quantitative rankings for a species should be scaled to equal unity across attributes, be it one or some other arbitrary value, that is the same for each species. In RM-217, the GSC is silent about issues of importance weights, and no explanation is offered for how it handled the collected values at the bottom of Table 6.

Because the purpose of the GSC was to "develop a credible management strategy to conserve the goshawk in the southwestern United States" (RM-217, p. 1), the importance weights of the 14 selected goshawk prey species should correspond to goshawk needs. On RM-217, p. 15, the importance of the various prey species is described as follows:

(1) "Sufficient prey habitats are provided so there is food to support goshawks in all seasons, especially during winter when fewer prey are available, and in years when prey populations are low due to factors such as drought or deep snow cover. Because no single prey species will be abundant enough to support goshawks, especially during winter, habitats for all 14 prey species are provided."

In RM-217, it is not made clear how the above statements were incorporated into a species importance weighting scheme for RM-217 Tables 6 and 7. Such an effort would require goshawk diet data for all seasons, and substantiated reasoning and explanations of methodology among weighting options and in support of assigned importance weights.

For example, one or more prey species may be particularly valued by goshawks, regardless of any generalized equity assumption as in passage (1) above. In RM-217, such an example is given on p. 12:

(2) "In Alaska, goshawks feed on relatively few species, and diets are dominated by the snowshoe hare (Lepus americanus) (McGowan 1975). A 10-year cycle in Alaskan snowshoe hare abundance (Keith 1963) was reflected in similar cycles in the number of active goshawk nests and the production of nestlings (McGowan 1975)."

If qualitative prey habitat decision models were constructed for goshawks in Alaska, importance weights for snowshoe hare would certainly exceed that assigned to prey species that are of lower utilization. Otherwise, the dependence on a decision map could be expected to produce irrational results and incorrect management recommendations. In fact, **Galotti (2002)** presents the following warning (p. 51):

"Decision maps usually are incomplete. People can overlook options, overlook criteria, give the wrong weights to their criteria, or ignore probability information. And they can do any combination of these."

In the case of goshawks in the southwest, the assignment of importance weights can be ascertained by assigning numeric values to the qualitative classes "none", "low", "medium" and "high" in RM-217 Table 6. For example, the following numeric assignments could be made:

none	=	0
low	=	1
medium	=	2
high	=	3

By summing these quantitative importance weights, the relative importance of each species can be understood in the context of the

qualitative decision-making process used in RM-217 to evaluate the results of the decision model. In Table 3 below, total species importance weights are shown in column 8. The sum of the species importance weights is exactly 180, and the range of individual species importance weights is 8 to 17.

Whereas Steller's jays were assigned an importance weight of 8, the blue grouse weight is 16, implying that blue grouse habitat needs are twice as important to goshawks as Steller's jay habitat. (Expressed as a percentage of the total assigned weights of 180, these values correspond to 4.4% and 8.9% respectively.)

In Appendix 2 (RM-217, p. 51-52), blue grouse were not found in goshawk diets in either Arizona ("Mannan & Boals 1990") or New Mexico (Kennedy 1991) (0% of diet), while Steller's jays composed 5% and 9% of goshawk diets, respectively, or 7% on average. Thus, though Steller's jays comprised 7% of observed goshawk diets, they were assigned only 4.4% of the total decision weight in RM-217 Table 6, and blue grouse were assigned 8.9% of the total decision weight, while comprising 0% of the observed goshawk diet in Arizona and New Mexico. If each of the 14 species had been weighted equally as implied in passage (1) above, every species would have been assigned 7.1% (1/14) of total decision weight.

Clearly, the "importance of special habitat attributes" in RM-217 Table 6 is biased toward specific species, without explanation. To further evaluate the results of the GSC's decision process, each individual species' importance weight, expressed as a percentage, may be divided by the mean percent composition of observed goshawk diets in Arizona and New Mexico. This value is labeled "Influence Ratio" in column 11 of Table 3, below, because it serves as a direct indicator of the total importance weight assigned to each species relative to cited goshawk diets in New Mexico and Arizona. The Influence Ratio shows the degree to which each prey species, and corresponding habitat attributes, were weighted to determine goshawk foraging area outcomes produced by the decision models.

Where the individual species importance weight equals observed goshawk diet composition, the influence ratio will equal 1. Influence ratios less than 1 indicate the species was considered by the GSC to be less important than goshawk utilization as observed in dietary composition. Influence ratios greater than 1 indicate the GSC placed more importance on the prey species than observed goshawk consumption.

In Table 3, influence ratios range from 0.5 for cottontails (even though they were the most significant species - 16% - in observed goshawk diets, their special habitat attributes received only one-half the respective weight), to 20.6 for mourning doves (the GSC considered doves to be nearly 21 times more important than the 0.4% of observed dietary contribution). Lastly, influence weights of infinity were assigned to blue grouse and red-naped sapsuckers. These latter two species had not been observed in goshawk diets in

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Table 3. Assigned importance weights for 14 selected goshawk prey species across eight special habitat attributes in RM-217 Table 6.

	1	2	3	4	5	6	7	8	9	10	11
	Snags	Downed Logs	Woody Debris	Opening	Large Trees	Herb, Shrub Understory	Interspersion of VSS	Total Species Importance Weight	%of Summed Weights (C8/180*100)	%of diet	Influence Ratio (C9/C10)
American robin	0	0	1	2	1	3	3	10	5.6	3.5	1.6
Band-tailed pigeon	1	0	0	3	2	2	2	10	5.6	1.0	5.6
Blue grouse	0	2	2	3	3	3	3	16	8.9	0.0	∞
Chipmunks	2	3	3	2	2	3	2	17	9.4	1.0	9.4
Cottontails	1	2	3	2	0	3	3	14	7.8	16.0	0.5
Hairy woodpecker	3	2	2	0	3	0	2	12	6.7	1.0	6.7
Mantled ground squirrel	1	3	3	2	2	3	2	16	8.9	9.0	1.0
Mourning dove	1	0	1	3	2	3	3	13	7.2	0.4	20.6
Northern flicker	3	3	1	1	3	2	3	16	8.9	9.0	1.0
Red-naped sapsucker	3	1	1	0	2	2	2	11	6.1	0.0	∞
Red squirrel	3	3	2	0	3	2	1	14	7.8	5.5	1.4
Steller's jay	1	1	1	0	3	1	1	8	4.4	7.0	0.6
Tassel-eared squirrel	1	2	1	0	3	1	2	10	5.6	7.0	0.8
Williamson's sapsucker	3	2	2	0	3	2	1	13	7.2	0.5	14.4
							Sum	180			

Notes: Attribute importance weights in columns 1-7 are quantitatively assigned from the qualitative rankings provided in RM-217 Table 6, p. 17, as follows: none=0, low=1, medium=2, high=3. The "Total Species Importance Weight" (column 8) is the sum, by species, of the quantitative importance weights for each of the 7 special habitat attributes in columns 1-7. Percent of diet (column 10) is calculated as the mean of goshawk diet composition for the 14 selected prey species in studies from Arizona and New Mexico (Mannan and Boals 1990 and Kennedy 1991), as listed in RM-217, Appendix 2, p. 51-52. Influence ratios (column 11) are calculated for each species as the percentage of the total weight assigned to the species, divided by the percentage composition the species represented in goshawk diets in Arizona and New Mexico. Species with influence ratios greater than 2.0 are highlighted with blue rows; species with less influence than dietary composition (influence ratio less than 1.0) are highlighted with yellow rows.

Arizona and New Mexico, but combined, they were assigned 15% of total decision weight by the GSC.

In Fig. 6, influence ratios are graphed against the species' composition observed in goshawk diets in Arizona and New Mexico (from columns 11 and 10 in Table 3 above). Clearly, a negative exponential relationship was used to represent the importance of special habitat attributes for the selected prey species. Species that were the most important in goshawk diets received the least weight, while prey species that were insignificant or not observed in goshawk diets received the greatest weights and, thus, excessively influence special habitat attributes. This extreme bias is obvious, but is not discussed in RM-217.

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RM-217, Table 7

The same issue of importance weighting applies to RM-217 Table 7. To determine how the qualitative weighting of prey species influenced the decision-making process for the determination of "desired forest conditions within northern goshawk home ranges", the following numeric assignments can be made in RM-217 Table 7:

blank	=	0
"X"	=	1
"XX"	=	2

The sum of the importance weights across all VSS and canopy cover classes for each species is the overall weight assigned to each respective species for the purpose of decision-making. Again, species with higher weights will have a greater influence on outcomes.

Goshawk prey species importance weights for the determination of desired forest conditions are shown below in column 17 of Table 4.

The sum of all species weights equals the total decision weight that was apportioned among the species, and as shown in Table 4 (this petition) for RM-217 Table 7, the total weight is exactly 200. As for Table 3 above, the individual species importance weight, when divided by 200, yields the percent of total weight each species assumed for the final decision model outcome (Table 4, column 18). When divided by the mean percent composition in observed goshawk diets for Arizona and New Mexico (Table 4, column 19), the resulting Influence Ratio (Table 4, column 20) shows how important the GSC considered each species to be relative to actual dietary composition. In Fig. 7, the graph of influence ratio vs. percent of observed goshawk diet shows a negative exponential bias that was applied in the determination of desired forest conditions.

In Table 4, it is clear that the importance weights vary greatly among species. Any implied suggestion that the prey species were approximately weighted equally, such as what *might* be inferred from passage (1) above, is not supported by the GSC weighting scheme.

Fig. 7 shows an obvious bias in the importance weights assigned in RM-217 Table 7. The highest weights were assigned to the prey species that were least important contributors to goshawk diets. As percent dietary contribution increases, the importance weights decrease dramatically. Just as for special habitat attributes in Fig. 6, even though cottontails' mean dietary contribution in Arizona and New Mexico is about 16%, the importance weight assigned in RM-217 Table 7 is half of the expected influence.

Stated simply, the result of the qualitative model in Table 7 emphasizes forest conditions for prey that are least important in goshawk diets. The more significant a prey species is to goshawks, the less the importance of the preys' habitat needs for determination of goshawk foraging habitat. The strength of this

negative exponential relationship in both Fig. 6 and Fig. 7 is compelling. Because the GSC did not present or discuss this issue, it is of value to attempt to understand such a strong bias. Blue grouse and red-naped sapsuckers were not found in goshawk diets in Arizona and New Mexico as shown in the table of Appendix 2 (RM-217). For this reason, their respective influence ratios are represented by infinity (forest condition weight/zero). Just as important, the assigned importance weight for blue grouse is 23 (Table 4, column 17). Thus, blue grouse were given the same influence for the determination of desired forest conditions as northern flickers, even though blue grouse had not been found in goshawk diets in the cited studies for Arizona and New Mexico.

Two particular prey species of significant dietary contribution were not included in the formal list of goshawk prey species: western bluebirds and blackbirds spp. (5% and 7.5% mean dietary contribution, respectively).

Collectively, these observations imply there was a purposeful reason for the negative exponential weighting, for the inclusion of species not found in goshawk diets in the southwest, and for the exclusion of others observed in goshawk diets in Arizona and New Mexico. Though it is not possible here to show purpose, it is relevant to further review RM-217 outcomes.

A cursory review of RM-217 Table 7 reveals that each of the 14 prey species were also weighted by VSS stage, and this is presumably a professional interpretation of forest structure needs as determined by "gleaning" and "synthesizing" the cited literature. It is assumed here that this weighting is intentional and correct.

For the total importance weight assigned to an individual prey species, the proportion assigned to VSS 6 (old forest) is shown in Table 4, columns 21 and 22. The higher the proportion, the greater the importance of mature and overmature forest for the respective goshawk prey species. For three of the four species with the highest apportioned VSS 6 importance weights (Table 4, column 22: red-naped sapsucker, Williamson's sapsucker and hairy woodpecker), each were assigned high influence ratios as seen in Table 4, column 20. Of the four prey species for which mature and overmature forest was of least importance, four (Table 4, column 22: Band-tailed pigeon, cottontail, American robin and northern flicker) were assigned low influence ratios. In Fig. 8, the corresponding values from Table 4 are shown graphically to demonstrate the bias in RM-217 toward VSS 6.

Similarly, goshawk prey species found by the GSC to have habitat attributes correlated with VSS 1-3 (forest openings and young forests) were assigned low importance weights, while the species assigned little to no habitat value in VSS 1-3 were strongly favored in the weighting scheme. This is shown in Table 4, columns 23 and 24, and in Fig. 9 (this petition).

The outcome of the qualitative decision model shows a strong tendency for prey species that prefer mature and overmature forests to have been assigned excessive influence on the determination of desired forest conditions in foraging areas, while the same species

Table 4. Assigned "desired forest condition" importance weights for 14 selected goshawk prey species across six VSS classes in RM-217 Table 7.

Column #	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
VSS	1		2			3			4			5			6									
Canopy Cover Class		A	B	C	A	B	C	A	B	C	A	B	C	A	B	C	Total Species Importance Weight	% of Summed Weights (C17/200*100)	% of diet	Influence Ratio (C18/C19)	VSS 6 Importance Weight (Sum of Cols. 14-16)	VSS 6 as Percent of Total Species Importance Weight (C21/C17*100)	VSS 1-3 Importance Weight (Sum of Cols. 1-7)	VSS 1-3 as Percent of Total Species Importance Weight (C23/C17*100)
American robin	1	1	1	0	1	1	0	1	2	0	1	2	0	1	2	0	14	7.0	3.5	2.0	3	21	5	36
Band-tailed pigeon	1	1	0	0	0	0	0	0	1	0	0	1	0	0	1	0	5	2.5	1.0	2.5	1	20	2	40
Blue grouse	2	2	1	0	1	2	0	1	2	2	1	2	2	1	2	2	23	11.5	0.0	∞	5	22	8	35
Chipmunks	1	1	1	0	1	1	0	2	2	0	2	2	1	2	1	1	18	9.0	1.0	9.0	4	22	5	28
Cottontails	2	1	1	0	1	1	0	2	1	0	2	1	0	2	1	0	15	7.5	16.0	0.5	3	20	6	40
Hairy woodpecker	0	0	0	0	0	1	1	1	1	1	2	2	2	2	2	2	17	8.5	1.0	8.5	6	35	2	12
Mantled ground squirrel	1	1	1	0	1	1	0	2	2	0	2	2	0	2	1	0	16	8.0	9.0	0.9	3	19	5	31
Mourning dove	1	1	0	0	1	0	0	1	1	0	1	1	0	1	1	0	9	4.5	0.4	12.9	2	22	3	33
Northern flicker	1	1	1	1	1	1	1	2	2	2	2	2	1	2	2	1	23	11.5	9.0	1.3	5	22	7	30
Red-naped sapsucker	0	0	0	0	0	0	0	0	1	1	0	2	2	0	2	2	10	5.0	0.0	∞	4	40	0	0
Red squirrel	0	0	0	0	0	0	0	0	1	2	0	1	2	0	2	2	10	5.0	5.5	0.9	4	40	0	0
Steller's jay	1	1	1	0	1	1	0	1	1	0	1	2	1	1	2	1	15	7.5	7.0	1.1	4	27	5	33
Tassel-eared squirrel	0	0	0	0	0	1	2	0	2	2	0	2	2	0	2	2	15	7.5	7.0	1.1	4	27	3	20
Williamson's sapsucker	0	0	0	0	0	0	0	0	1	1	0	2	2	0	2	2	10	5.0	0.5	10.0	4	40	0	0
																Sum	200							

Notes: Species with the lowest VSS 6 weights are highlighted with yellow rows; species with the highest VSS 6 weights are highlighted with blue rows.

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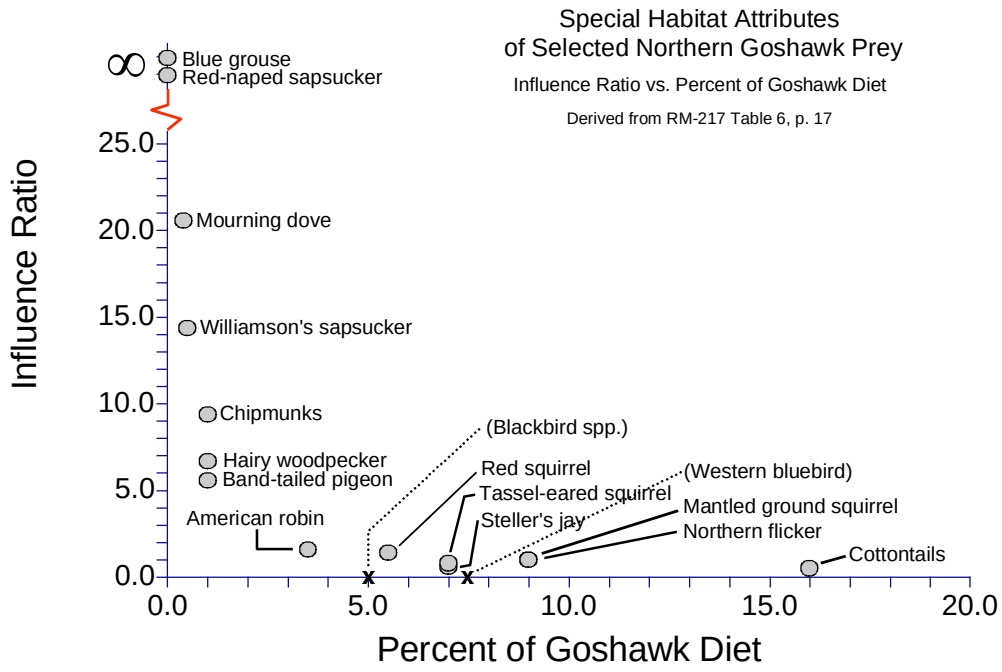

Fig. 6. Special habitat attributes of selected northern goshawk prey. Influence ratio vs. percent of goshawk diet.

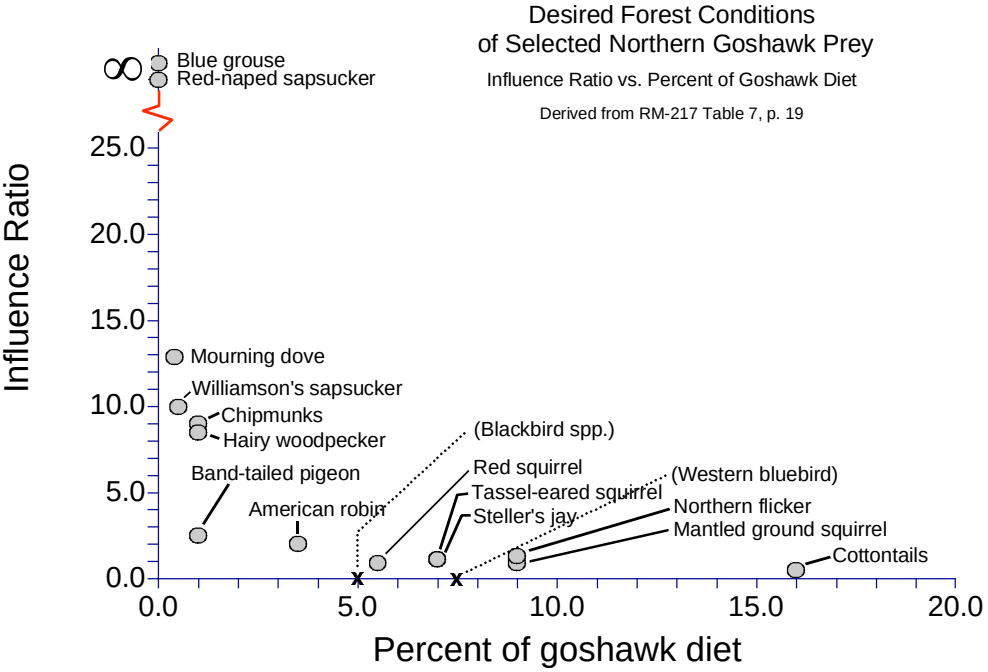

Fig. 7. Desired forest conditions of selected northern goshawk prey. Influence ratio vs. percent of goshawk diet.

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tend to be of much lower importance in goshawk diets. Conversely, species that have the lowest preference for mature and overmature forests were weighted so as to have the least influence on the determination of desired forest conditions, while also tending to be of much higher importance in goshawk diets.

A question remains regarding western bluebirds and blackbird spp. In RM-217 Appendix 2 (p. 52), the mean dietary composition for goshawks in Arizona and New Mexico (Mannan & Boals (1990), and Kennedy (1991)) is 7.5% for western bluebirds and 5% for blackbird spp., but neither were included in the group of 14 selected prey species. This is a direct contradiction with the inclusion of blue grouse and the red-naped sapsucker, which were not found in goshawk diets in New Mexico and Arizona. The importance weights for western bluebirds and blackbird spp. are therefore equal to zero, as are the corresponding influence ratios. To demonstrate, both species are represented by "**X**" symbols in Fig. 6 and Fig. 7 (this petition), and the complete lack of influence in the GSC decision models presents an inquisitive question: why were they not included in the list of 14 goshawk prey species?

In the brief discussion of VSS on RM-217, p. 15, reference was made to Thomas et al. 1979:

(3) "An integrative approach, combining vegetation and forest growth, has been developed for the Southwest (after Thomas et al. 1979) and is a generalized description of forest age and tree size from seedling to old forests."

In Thomas et al. 1979, the only related statement is on p. 65:

(4) "The successional stage of the surrounding plant community also influences the way wildlife use snags (fig. 39)."

The sentence immediately following the above statement is[3]:

(5) "Bluebirds and house wrens will use cavities in a snag that occurs in the grass-forb stage or shrub-seedling stage and will not ordinarily use the same sang if it is surrounded by more advanced successional stages."

Szaro and Balda (1986), a cited reference used in RM-217, stated the following about western bluebirds on p. 258, under "Treatment Effects":

Following two pages:

Fig. 8. Desired forest conditions of selected northern goshawk prey - VSS 6 importance weights.

Fig. 9. Desired forest conditions of selected northern goshawk prey - VSS 1-3 importance weights.

[3] See Appendix 3, A3.15.1, for discussion related to the Thomas et al. (1979) citation.

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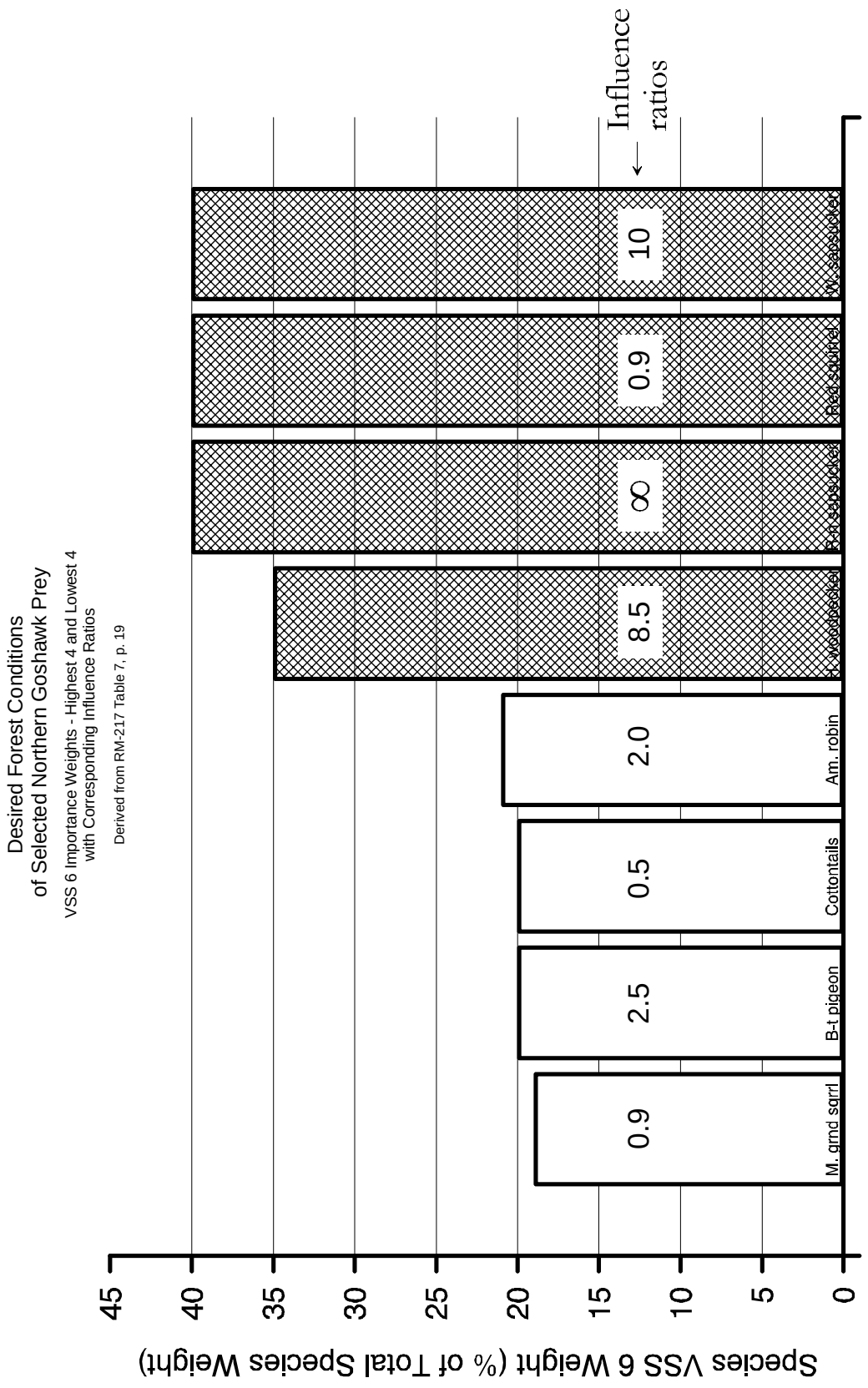

Fig. 8. Desired forest conditions of selected northern goshawk prey - VSS 6 importance weights. The goshawk prey species shown have the highest four, and lowest four, VSS 6 weights. Corresponding decision model influence ratios are included as labels on respective species' bars.

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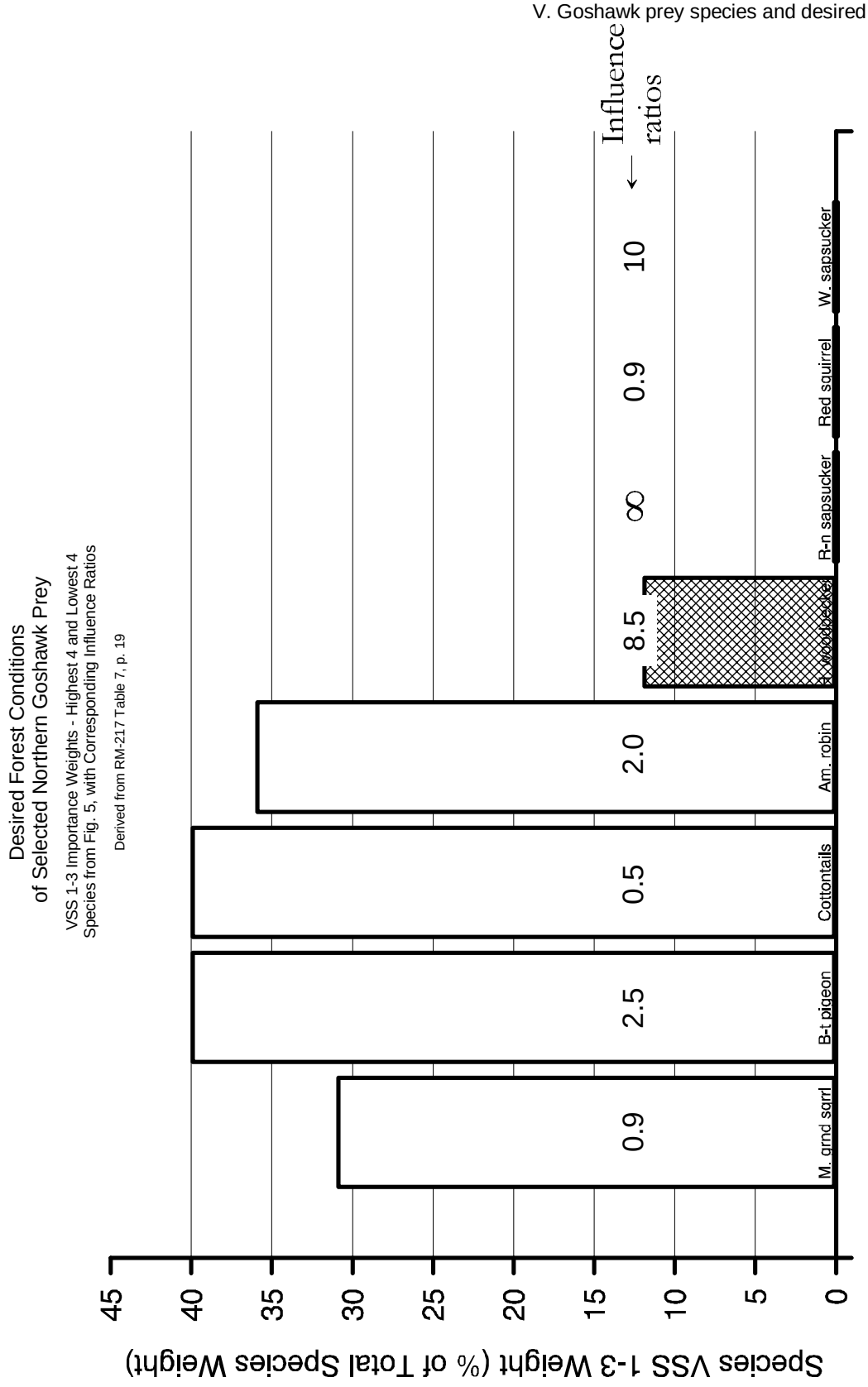

Fig. 9. Desired forest conditions of selected northern goshawk prey. For VSS 1-3 importance weights, the goshawk prey species shown have the highest four, and lowest four, VSS 1-3 weights. Corresponding decision model influence ratios are included as labels on respective species' bars.

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(6) "In our study those species that require a more open habitat -- rock wren (Salpinctus obsoletus), American robin (Turdus migratorius), western wood-pewee (Contopus sordidulus), and western bluebird -- were densest on either medium or heavy cut plots or both."

"Of the 15 species found on all forested plots, 5 -- chipping sparrow (Spizella passerina), western bluebird, broad-tailed hummingbird (Selasphorus platycercus), Grace's warbler, and dark-eyed junco -- had their highest population densities on treated plots in 1974 and 1975, indicating a preference for the increased openness of the canopy."

Literature cited in RM-217 clearly indicated that western bluebirds favor open forest conditions and thus low VSS classes. It is unrealistic to believe this general knowledge of western bluebirds was either unavailable or overlooked by the GSC. In addition, in a separate reference for the related mountain bluebird, (not cited in RM-217 but none-the-less relevant,) **Power (1980)** noted on p. 63:

(7) "It would appear that grazing is important in bluebird resource use because it generates places of short vegetation, keeps them short, and speeds the succession of woody plants that provide large perches and potential sites in which woodpeckers may excavate nest holes. It might, therefore, be true that any impetus for the cattle industry of the West that promotes grazing is also an impetus for Mountain Bluebird populations *provided* that it does not result in grazing so heavy that grassland is destroyed."

Even **Udvardy (1977)** provides this observation about western bluebirds on p. 629:

(8) "Habitat: Open woodland and pasturelands where old trees provide nest sites."

Clearly, there is a potential relationship between bluebird habitat suitability and (1) clearcuts with retained snags, (2) other cutting methods that create open stand conditions, and (3) grazing. Since western bluebirds were 7.5% of the mean goshawk diets in Arizona and New Mexico, their inclusion in the list of goshawk prey would have countered the bias toward mature and overmature forest conditions, as well as the bias against even-aged management and grazing (discussed later).

The failure to include blackbirds spp. in the list of prey species also suggests that a correlation between grazing and goshawk prey species was avoided.

From **Udvardy (1977)**:

(9) p. 457, red-winged blackbird: "Red-wings form the nucleus of the huge flocks of mixed blackbird species that feed in fields, pastures, and marshes from early fall to spring. Although blackbirds are often considered pests because they consume grain in farmers' fields, farmers benefit because the birds consume harmful insects during the nesting season."

(10) p. 679, brown-headed cowbird: "Habitat: During breeding season, woodlands, light stands of trees along rivers, suburban gardens, city parks, and ranches. At other times, in mixed flocks with other blackbirds in fields and pastures."

(11) p. 551, Brewer's blackbird: "Habitat: Brushy savanna, irrigated pastures, roadsides, streamside thickets, towns, feed lots."

"Following man and his cattle, the Brewer's first pushed north into Washington State around the turn of the century."

The outcome of the qualitative decision models in RM-217, Tables 6 and 7, directly implies that the GSC decision models are biased against forest resource utilization in a manner that is wholly contrary to goshawk prey species habitat utilization.

In addition, Costa, Ffolliott and Patton, in "Cottontail responses to forest management in southwestern ponderosa pine" (**Costa et al. (1976)**), concluded in their study of cottontail populations following various silvicultural treatments:

(12) "Although there are various alternatives for managing Arizona ponderosa pine forests, apparently only one system, clearcutting, has a long-term beneficial effect on the desert cottontail."

Though two other publications by Ffolliott and five by Patton were cited elsewhere in RM-217, **Costa et al. (1976)** was not, and the importance of significant openings in ponderosa pine forests was therefore significantly diminished in RM-217. The corresponding low influence ratios assigned to cottontails (see Fig. 6 and Fig. 7), despite the observation that cottontails were the most important goshawk prey species (Table 3, column 10), (a matter akin to goshawks' snowshoe hare preference in Alaska highlighted in RM-217,) further indicates that certain forest attributes beneficial to goshawk prey species and hence goshawks, such as even-aged silvicultural systems and young stands (low VSS classes), were avoided and de-emphasized by the GSC as evidenced by the incongruous importance weights incorporated into RM-217 Tables 6 and 7.

Regarding cottontails, the GSC stated on RM-217, p. 60:

(13) "In Arizona, desert cottontails are found at elevations below 6,000 feet in brushy areas as well as xeric forest habitats (e.g., ponderosa pine (Cockrum 1982, Ffolliott 1990))."

On RM-217 p. 61:

(14) "No information was found on specific management recommendations for southwestern populations of any of three cottontails." [Desert, Eastern and Mountain.]

On RM-217 p. 17, referring to RM-217 Table 6:

(15) "Only three species (band-tailed pigeon, mourning dove, and blue grouse) have a high importance value for openings; blue grouse for nesting and brood-rearing, and the pigeon and dove for feeding."

Under "Synthesis of Desired Forest Conditions", for "Foraging Areas", it was concluded from the qualitative decision models that (RM-217, p. 19):

(16) "Goshawk foraging habitat will have sustainable and abundant prey when the majority of forests are in older age classes."

Passages (12)-(16) demonstrate that the importance of cottontails and cottontail habitat were severely diminished in RM-217. Though cottontails comprised, on average, 16% of observed goshawk diets in New Mexico and Arizona (Table 4, column 19), the applied influence ratio of 0.5 (Table 4, column 20) is in direct contrast to the influence ratios for other prey species of lesser value to goshawks. Referring again to Table 4 and Fig. 8 of this petition, the four prey species weighted most heavily toward VSS 6 conditions (hairy woodpecker, red-naped sapsucker, red squirrel and Williamson's sapsucker) comprise 23.5% of total decision model importance weights (Table 4, column 17) and 7% of observed goshawk diets (column 19). Cottontails were assigned 7.5% of total decision model importance weights, but comprised 16% of observed goshawk diets.

The outcome bias toward mature and overmature forest conditions is a bias toward VSS 5 and VSS 6. The bias causes rotation ages for even-aged management to be arbitrarily extended, and maximum tree sizes and associated tree ages to be arbitrarily increased for uneven-aged management.

The outcome bias toward mature and overmature forest conditions is a bias *against* more intensive forest management and *for* reduced forestry activities; the bias *away* from prey species of greater importance to goshawks is a bias *away* from more open forest conditions and even-aged management; the bias emphasizing inclusion of prey species not found in southwest studies of goshawk diets, and also emphasizing exclusion of species found in southwest diets of goshawks, is a bias *toward* mature and overmature forests conditions, and *away* from more open forest conditions and forest resource utilization associated with important goshawk prey habitat, active forest management and grazing activities.

The bias is so compelling, it can only be reasoned that the determination of preferred forest conditions for goshawk foraging areas was driven by a GSC desire to reduce forestry activities and

other uses of forest resources while meeting preconceived notions of desired forest structure and preferred, reduced forest management activity levels. It is more than an issue of coincidence that this analysis, applied independently to two entirely different decision models for RM-217 Tables 6 and 7, could result in the strong negative exponential relationships for influence ratios shown in Fig. 6 and Fig. 7 of this petition, and the biased VSS weighting schemes shown in Fig. 8 and Fig. 9.

The explained qualitative decision model bias is real. The contents of RM-217 suggest strongly that the goshawk prey habitat/foraging area characteristics bias was intentional, and the outcomes were decided in a deliberate, non-objective and systematic manner not revealed by the GSC.

2. Explanation of noncompliance with OMB and/or USDA Information Quality Guidelines.

OMB Guidelines: In RM-217, the selection of goshawk prey species and desired foraging area conditions violate the objectivity requirements for presentation as defined in V.3.a, and for substance, as defined in V.3.b. The presentation of prey species selection, qualitative decision models, and prey species habitat needs is inaccurate, unclear, incomplete and biased; the substance is inaccurate, unreliable and biased. Further, the information presented cannot be substantially reproduced, as defined in V.10, and the development of desired forest characteristics for foraging areas in RM-217 is not transparent.

USDA Guidelines: For Regulatory Information, RM-217, in regard to goshawk prey species selection and subsequent determination of desired foraging area conditions, as based on the determination of goshawk prey species habitat needs, is based on a series of qualitative assessments. Therefore, RM-217 violates USDA transparency requirements, including but not limited to, the transparency guidelines:

> "Ensure transparency of the analysis by:
>
> > "Presenting a clear explanation of the analysis to the intended audience.
> >
> > "Providing good documentation of data sources, methodology, assumptions, limitations, uncertainty, computations, and constraints.
> >
> > "For quantitative assessments, clearly state the uncertainty of final estimates to the extent practicable. Data and data collection systems should as far as possible, be of sufficient quality and precision that uncertainty in the final estimates is appropriately characterized.
> >
> > "For qualitative assessments, present the nature of the uncertainty."

3. Explanation of the Effect of the Alleged Error

The effect of the errors is to require U.S. Forest Service forest managers to target highly specific forest attributes and conditions that are incorrect for the stated purpose of sustaining goshawk

populations. Increased management costs associated with errant and highly specific forest conditions decrease financial returns and increase costs to the U.S. Forest Service, requiring these costs to be passed to taxpayers that fund the agency. The requestors pay federal taxes and/or represent others that do.

Further, the resultant foraging area recommendations are likely to contradict goshawk needs. The creation and maintenance of highly specific, incorrect and biased forest attributes and characteristics may cause unanticipated and unwarranted changes in wildlife populations, reductions in goshawk populations, negatively impact ecosystem function, and degrade the requestors' enjoyment of forest amenities on National Forests.

The demonstrated and unwarranted bias toward "old forest" conditions incorrectly increases maximum tree sizes and associated tree ages for uneven-aged management, and incorrectly extends rotation ages for even-aged management. Lengthened rotations and increased age targets result in increased mortality losses and decreased forest growth potential otherwise accumulated in commercial timber available for harvest. Additionally, the incorrect bias against younger forest age classes reduces opportunities to correctly apply silvicultural treatments that result in the best growth response to reduced densities - that is, when trees are young and best able to occupy newly available growing space. The effect of the consequences described in this paragraph is to cause substantial losses of forest growth otherwise captured on crop trees that would result in higher volumes of quality timber available for harvest. Reduced timber size, quality and harvest levels negatively impact local and regional economies, causing harm to communities and the forest products sector, and hence to the requestors.

VI. Vegetation Structural Stage

1. Explanation of substandard quality issues, with supporting documentary evidence.

VSS inadequately supported by documentation and lacks theoretical basis

The Vegetation Structural Stage classification scheme for forest development is poorly conceived, using only on an inadequate and misrepresented citation as a theoretical basis, and is readily shown to be impossible to apply to uneven-aged stand conditions.

In the glossary of RM-217 on p. 90, Vegetation Structural Stage (VSS) is defined as:

(1) "A generalized description of forest growth and aging stages based on the majority of the trees in the specific diameter distribution of the stand. For our purposes, 6 growth and aging stages were identified. If the majority of the stems of a stand (based on basal area) were in the 12-18 inch diameter class, the stand would be classified as a VSS 4. The tree diameter range and description for the vegetation structural stages are:"

(2)

Stage	DBH Range (inches)	Description
1	0-1	grass-forb-shrub (opening)
2	1-5	seedling/sapling
3	5-12	young forest
4	12-18	mid-age forest
5	18-24	mature forest
6	24"	old forest

On RM-217 p. 15, it is stated:

(3) "An integrative approach, combining vegetation and forest growth, has been developed for the Southwest (after Thomas et al. 1979) and is a generalized description of forest age and tree size from seedling to old forests."

VSS theoretical basis and supporting documentation

Thomas et al. (1979) is a chapter titled "Snags" in the 1979 U.S. Forest Service Handbook, "Wildlife habitats in managed forest". It is inappropriate to cite Thomas et al. (1979) as the basis for VSS. See Appendix 3, section A3.15.1, for additional discussion of the Thomas et al. (1979) citation.

On RM-217 p. 15, the theoretical basis for VSS is briefly described as the integration of community associations and/or forest cover types with concepts of forest growth. Instead, the assignment of age classes to diameter classes in passage (2) ignores established concepts of forest growth. Though the GSC indirectly acknowledged the generally poor correlation between tree diameter and age (RM-217, p. 81) and the ability to alter growth rates through silvicultural treatments, the matter was ignored in implementation as evidenced by the consistent application of the designated VSS diameter/age class relationship in passage (2), the purported relationship between VSS 6 and stand ages for "desired" forest conditions in Table 1, RM-217 p. 7, and the minimum stand age requirements associated directly with VSS classes for the nest stand requirements of Table 5 (RM-217, p. 14).

Because trees will usually respond to reductions in stocking by increasing growth rates, forest development models that classify forests under the assumption that tree diameter equals age are flawed. See Fig. 10, below. The simple action of thinning altered the growth rate and hence the size of the tree, but not its rate of aging. In a thinned stand, the treatment will change subsequent VSS classification in the future, while having no impact on age. An unthinned stand would be classified in a younger VSS class, even though it would be the same age as the thinned stand in later decades. Variations in targeted stocking levels would result in varying VSS classifications that are age-based, without altering the rate of aging. Other nonanthropogenic factors that cause variations in stocking levels (insects and disease, site quality, regional climate) will also result in varied VSS classifications, without altering aging rates.

At the stand level, the confounding interactions of stocking, density and other site attributes must be considered when describing, modeling or predicting forest stand growth. Except for the extreme case of intensively managed pure even-aged stands, age alone is grossly inadequate for classifying mean stand diameters, and vice versa. **Smith et al. (1997)** describe the complexities of stand growth and yield modeling on p. 79:

(4) "Among the independent stand variables commonly used are age, basal area, numbers of trees, site index, average diameter, wood volumes, and various indexes of stand density based on the aforementioned relationships between average D.B.H. and the numbers of trees."

Limiting the conceptual development of forest stands to the rigid size/diameter relationships assigned in the VSS classification scheme directly implies that forest conditions that do not fit the

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arbitrary definition are exceedingly rare or nonexistent, and further implies that goshawks and goshawk prey demonstrate an inherent ability to detect both mean stand diameter and stand ages by expressing habitat selection preferences based on the interaction of the two. The GSC failed to demonstrate or document how these assumptions were adopted and supported for the defined VSS classes.

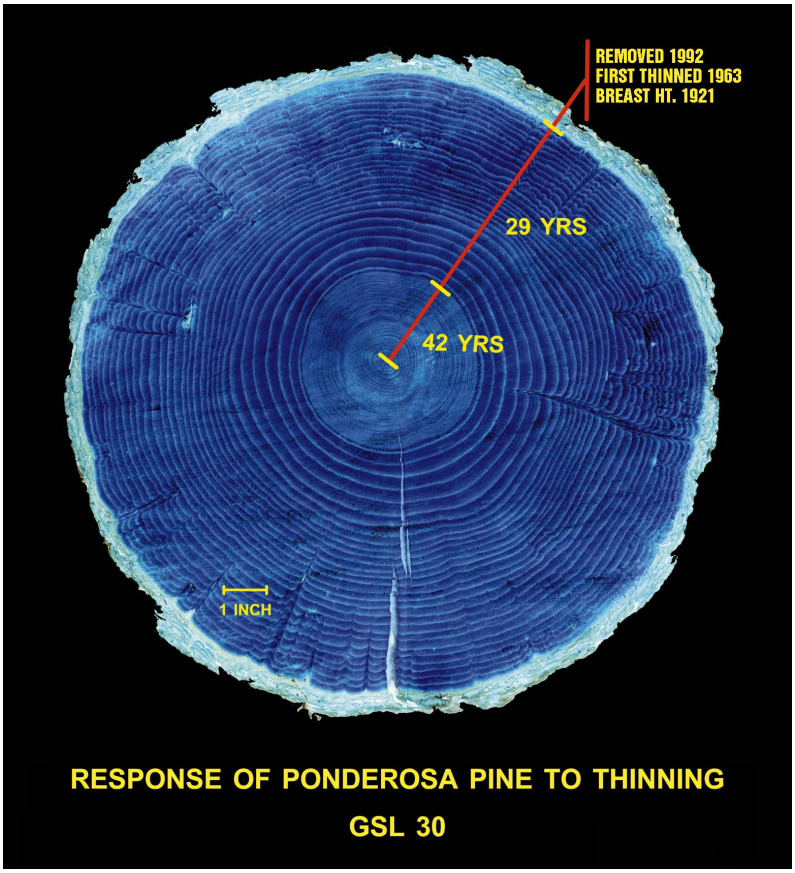

Fig. 10. Response of ponderosa pine to thinning. Taylor Woods permanent growth and yield plots, GSL 30, Fort Valley Experiment Station, USDA Forest Service, northern Arizona.

Uneven-aged stands, by definition, defy classification by stand age, and whether self-maintained or actively managed, true uneven-aged/multi-storied stands demonstrate little variation in mean tree diameter in the absence of significant perturbations. Thus, all uneven-aged stands will possess a permanent mean diameter, a permanent mean stand age, and a maximum tree age for relatively rare trees at the upper end of the diameter distribution. Uneven-aged stands, whether they are simple three-storied stands or the altruistic all-aged condition, defy classification under the VSS stand development model.

The Gus Pearson Natural Area (GPNA) in northern Arizona is a common focal point for academic discussions in the debate over the concept of pre-European forest conditions and forest restoration for

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ponderosa pine forests. As such, the uneven-aged diameter distribution at GPNA is particularly noted for the presence of large-diameter yellow pine and, in more recent decades, the presence of significant stocking in small diameter classes. GPNA inventory data from 1992 is shown below in Table 5 by 1" diameter classes:

Table 5. Gus Pearson Natural Area inventory data, 1992, 11.57 acres[1].

DBH Class (inches)	N	TPA	BA
1	1792	154.86	1.90
2	3978	343.76	11.72
3	3031	261.93	17.50
4	2137	184.67	20.40
5	1229	106.20	17.52
6	749	64.73	14.92
7	520	44.94	13.79
8	317	27.39	10.79
9	236	20.39	10.04
10	154	13.31	8.00
11	82	7.09	5.11
12	59	5.10	4.35
13	30	2.59	2.58
14	18	1.56	1.78
15	25	2.16	2.83
16	5	0.43	0.64
17	6	0.52	0.87
18	5	0.43	0.81
19	2	0.17	0.36
20	5	0.43	0.99
21	7	0.60	1.53
22	6	0.52	1.43
23	9	0.78	2.34
24	7	0.60	1.98
25	7	0.60	2.15
26	6	0.52	1.99
27	8	0.69	2.85
28	7	0.60	2.68
29	18	1.56	7.38
30	11	0.95	4.82
31	12	1.04	5.61
32	7	0.60	3.48
33	7	0.60	3.70
34	5	0.43	2.80
35	4	0.35	2.38
36	4	0.35	2.51
37	2	0.17	1.33
38	0	0.00	0.00
39	2	0.17	1.47
40	0	0.00	0.00
41	0	0.00	0.00
42	0	0.00	0.00
43	1	0.09	0.89
44	1	0.09	0.93
45	0	0.00	0.00
46	0	0.00	0.00
47	0	0.00	0.00
SUM		1253.98	201.15

[1] Data on file, USDA Forest Service, Rocky Mountain Experiment Station, Fort Collins, CO.

In Table 6, the data from Table 5 is collapsed into VSS diameter classes:

Table 6. Stocking by VSS diameter classes on the Gus Pearson Natural Area, 1992.

VSS Class	VSS DBH class	Basal Area	Pct of Total BA
2	1-5	51.5	25.6
3	5-12	80.2	39.9
4	12-18	13.1	6.5
5	18-24	7.5	3.7
6	24+	49.0	24.3
	Sum	201.2	100.0

Using the definition of VSS in passage (1) above, the total basal area at Gus Pearson is 201 ft^2/ac, and a majority, more than 100.5 ft^2/ac, must exist in a VSS DBH class to fit into the VSS forest development scheme. Since the most basal area in a diameter class is found in the 5-12" class, and it actually includes only 39.9% of total basal area, the VSS criteria do not fit the Gus Pearson Natural Area. In fact, no DBH class is even close to a majority of stocking.

There is no opportunity for loosely interpreting the VSS classification in RM-217. Even a "plurality of stocking" rule would force the Gus Pearson Natural Area to be classified as a "young forest" (VSS 3), and since GPNA is known for its "old growth" characteristics, this would be irrational.

To show that the diameter distribution at GPNA is not a unique classification anomaly using VSS, Table 7 below shows pre-treatment diameter distributions using VSS classes, by basal area, for six 10-acre uneven-aged plots established on the Kaibab Plateau of northern Arizona by the USDA Forest Service, Rocky Mountain Experiment Station.

In not one instance for the growth plots does a single VSS diameter class come close to meeting the majority basal area requirement of RM-217. In fact, the uneven-aged stands are comprised of several ponderosa pine cohorts, and the forests would be correctly described as multi-storied and represented by an irregular uneven-aged diameter distribution.

Once brought into regulation, such uneven-aged stands are not likely to ever have a majority of basal area in any VSS diameter class.

In summary, Vegetation Structural Stages, an even-aged concept, does not and cannot apply to uneven-aged stands.

Table 7. Pre-treatment stocking on six 10-acre permanent uneven-aged growth plots, North Kaibab Ranger District, Kaibab National Forest, Arizona[1,2]. 1991 data.

Unit	VSS DBH Class	Basal Area	Pct of Total BA
1	1-< 5	3.33	2.9
1	5-<12	11.67	10.3
1	12-<18	32.50	28.7
1	18-<24	38.33	33.8
1	24+	27.50	24.3
2	1-< 5	3.33	3.0
2	5-<12	26.67	24.1
2	12-<18	24.17	21.8
2	18-<24	36.67	33.1
2	24+	20.00	18.0
3	1-< 5	15.00	15.6
3	5-<12	21.00	21.9
3	12-<18	17.00	17.7
3	18-<24	22.00	22.9
3	24+	21.00	21.9
4	1-< 5	1.82	1.7
4	5-<12	17.27	16.5
4	12-<18	19.09	18.3
4	18-<24	39.09	37.4
4	24+	27.27	26.1
5	1-< 5	1.11	1.0
5	5-<12	12.22	11.5
5	12-<18	20.00	18.7
5	18-<24	41.11	38.5
5	24+	32.22	30.2
6	1-< 5	5.00	4.4
6	5-<12	11.25	10.0
6	12-<18	26.25	23.3
6	18-<24	42.50	37.8
6	24+	27.50	24.4

[1]Trees less than 1" DBH are not included and represent a negligible proportion of total stocking.
[2]Source data on file, USDA Forest Service, Rocky Mountain Experiment Station, Fort Collins, CO.

The concept of VSS is clearly defined in passage (1) as applying to forest stands. In the glossary of RM-217, a "stand" is defined on p. 89:

(5) "**Stand**---An area of trees possessing sufficient uniformity (species composition, age, and physical features) to be distinguishable from trees on adjacent areas."

On RM-217 p. 25, Figure 12 is used to demonstrate group selection. The Figure 12 caption follows:

(6) "The group-selection regeneration method is appropriate in both post-fledging family areas and foraging areas."

On RM-217 p. 88, group selection is defined as:

(7) "**Group selection**---A regeneration method in the uneven-aged silvicultural system in which trees are removed in small groups. The purpose is to create a stand with 3 or more age classes."

The VSS definition in passage (1) states with all certainty that it applies at the stand level, and it describes the progression and development over time of even-aged stands (also, see passage (3)). The definition was then ignored in RM-217 by applying it to stands of non-uniform structure (uneven-aged stands), and even beyond stands, across the landscape (post-fledging areas and foraging areas). On RM-217 p. 27, the desired stand structure for all forest types in foraging areas is described as:

(8) "A mosaic of vegetation structural stages interspersed throughout the foraging areas in small patches."

For comparison, the following passages from **Smith et al. (1997)** verify the RM-217 terms presented above:

(9) (p. 11): "A **stand** is a contiguous group of trees sufficiently uniform in species composition, arrangement of age classes, site quality, and condition to be a distinguishable unit."

(10) (p. 12): "The simplest kind of stand development process is that of the **pure even-aged stand** in which the trees are "pure", that is, all of one species, and start together after the previous stand is removed; such stands are often ones that have been planted."

(11) (p. 13): "**Uneven-aged stands** have trees or, more commonly, groups of trees of different ages and much more complicated developmental patterns."

In RM-217, VSS in passage (1) is defined to describe the development of even-aged stands, as defined in passage (5), that in turn is relevant to the pure even-aged stand description by **Smith et al. (1997)** in passage (10). RM-217 and **Smith et al. (1997)** agree closely on the definition of a stand in passages (5) and (9); and, be it "groups" or "patches", the descriptions of uneven-aged conditions in passages (8) and (11) describe uneven-aged stand structure. In RM-217, it is clear in passage (8) that uneven-aged stands are stated

to be the desired forest condition across post-fledging areas and foraging areas.

VSS, by both the RM-217 definitions in passages (1), (2) and (3), and as demonstrated by the uneven-aged diameter distribution at the Gus Pearson Natural Area and the permanent uneven-aged plots on the Kaibab National Forest, does not and cannot apply to the uneven-aged condition described in RM-217 in passage (8).

Therefore, VSS cannot be used to describe the very stand conditions identified in passages (6) and (8) as desired for post-fledging areas (420 acres) and foraging areas (5400 acres), and the "desired forest conditions" specified in Table 1 (RM-217, p. 7), and on RM-217 pp. 23 and 27, are meaningless in the context of VSS for uneven-aged forest conditions in post-fledging and foraging areas.

Thus:

1. In RM-217, the cited reference of Thomas et al. (1979), designated as the model for development of VSS, is substandard and inadequate, and hence no sufficient theoretical basis for VSS, and its applicability to stated/desired forest stand conditions, was described.

2. The assignment of diameter classes to VSS stages in passage (1) directly negates the applicability of VSS to a variety of real-world forest stand conditions, and does not allow for variability in tree diameters resulting from differences in stand density caused by thinning and nonanthropogenic factors.

3. The VSS classification scheme cannot (by definition) and does not (through restrictive diameter class/age assignments) apply to the uneven-aged conditions desired for post-fledging areas and foraging areas, even though VSS targets are formally assigned (RM-217 Table 1, p. 7).

4. The result is that an inappropriate and limited even-aged stand development model was defined without adequate explanation or supporting references, and incorrect even-aged stand structure targets were assigned for implementation across uneven-aged stands and landscapes in National Forests of the southwest.

2. Explanation of noncompliance with OMB and/or USDA Information Quality Guidelines.

OMB Guidelines: In RM-217, the creation and application of VSS violates the objectivity requirements for presentation as defined in V.3.a, and for substance, as defined in V.3.b. The presentation of VSS is inaccurate, unclear and incomplete; VSS substance is inaccurate, unreliable and biased. Further, the conceptual development of VSS, and its application, and particularly in regard to VSS application to uneven-aged stands, cannot be substantially reproduced, and as defined

in V.10, the development and application of VSS requirements and recommendations in RM-217 are not transparent.

3. Explanation of the Effect of the Alleged Error

The effect of the errors is to require U.S. Forest Service forest managers to implement a forest development model, VSS, that is inadequately developed. The application of VSS recommendations to uneven-aged forests is not possible, and therefore VSS does not apply in concept or in practice. Therefore, incorrect VSS requirements and recommendations are not achievable. The effect is to increase management costs accrued as forest managers attempt to implement directives that are not transparent, and that will contradict scientific concepts of uneven-aged management. Increased management costs and delays associated with the implementation of errant VSS requirements decrease financial returns to the U.S. Forest Service, requiring increased costs to be passed to taxpayers that fund the agency. The requestors pay federal taxes and/or represent others that do.

Further, the incorrect VSS requirements in RM-217 are likely to contradict goshawk needs. The GSC argues in RM-217 that uneven-aged forest conditions are required to sustain goshawk populations. Uneven-aged management cannot be implemented through the use and application of VSS as created, discussed and recommended in RM-217. The resultant uncertainties may cause reductions in goshawk populations, negatively impact ecosystem function, and degrade the requestors' enjoyment of forest amenities on National Forests.

VII. Extrapolation from targeted populations

1. Explanation of substandard quality issues, with supporting documentary evidence.

Failure to identify and abide by target populations for goshawk nest stands and nest areas

In RM-217, the GSC failed to identify target populations for the sources of its own presented data, as well as for data and conclusions originating from cited references. The result is that the goshawk management recommendations present required and desired forest stand criteria that are intended by the GSC for application beyond the legitimate populations that were targeted for sampling, producing irrational results that are impossible and/or illogical to apply.

About sampling bias. It is noted in this section and elsewhere in this petition that the purposeful location of a sample point or plot at the nest tree introduces bias depending on how the data is interpreted and what inferences are attempted.

As a matter of common sensibility, a goshawk nest will likely be located in a tree. The tree has a crown, and most commonly the tree will be live. Locating a sample point (or plot) at the nest tree dictates the point will be under the tree. Canopy cover measurements at the nest tree point are indicative of the conditions overhead, wherein the point was purposefully located under a tree crown, and hence sample canopy cover measurements are biased if nest tree point data is pooled with points (or plots) not located at nest trees.

Similarly, extrapolation of forest conditions from nest sites to populations beyond nest sites, including stands and landscapes, is incorrect because of the inherent bias.

Mendenhall (1979) defines a population and a sample as follows (p. 5):

(1) "A **population** is the set representing all measurements of interest to the sample collector."

(2) "A **sample** is a subset of measurements selected from the population of interest."

Snedecor and Cochran (1976) emphasize the importance of the population to statistical inference (p. 4):

(3a) "A *sample* consists of a small collection from some larger aggregate about which we wish information. The sample is examined and the facts about it learned. Based on these facts, the problem is to make correct inferences about the *aggregate* or *population*. It is the sample that we observe, but it is the population which we seek to know."

Snedecor and Cochran (1976) define *target population* on p. 30:

(3b) "The *target population* is the aggregate about which the investigator is trying to make inferences from his sample. Although this term is not in common use, it is sometimes helpful in focusing attention on differences between the population actually sampled and the population that we are attempting to study."

For nest stand characteristics in RM-217, including the explicit quantitative criteria in RM-217 Table 5 (p. 14), the GSC described the intended application of the criteria on RM-217 p. 13:

(4) "Table 5 presents **minimum** attributes required for goshawks on locations with 'low' and 'high' productivity."

"Low" and "high" productivity refers to the use of site index as a determinant of nest stand criteria, where site index values of 55 and 50, for ponderosa pine and mixed species (mixed conifer) forest stands respectively, are decisive threshold parameters for differentiating structural habitat attributes for goshawk nest stands. No explanation and no data was offered to support site index differentiation, and none of the cited references used in RM-217 in support of goshawk habitat criteria, and reviewed for this petition, offered original research or discussed a related and significant relevance of site index to differentiation of goshawk nest stand characteristics.

The core of this issue centers on the failure to identify the target population (in this case, all goshawk nest stands in the Southwest, by forest type) and, just as importantly, no evidence or documentation was provided that the target population was even sampled and, subsequently, that site index was the subject of a pertinent analysis. The failure to correctly identify and sample goshawk nest stands extends beyond site index, to the primary nest stand characteristics presented as "**minimum** attributes" in RM-217 Table 5.

If all stands could be identified in the Southwest, some proportion might be hypothesized to possess certain identifiable and significant attributes that are correlated with and perhaps predictive of goshawk nest suitability. The GSC implied, but never explicitly stated, that such characteristics had been identified, and then presented apparent results in RM-217 Table 5.

The definitions of a forest stand were reviewed in Section VI above. One method for reviewing the outcome of the GSC management recommendations is to review very large samples of forest stands to determine the proportion of existing stands that meet the RM-217

nest stand requirements. This can be done with source stand data used to construct Gingrich-style stocking charts. This data is available and on file at the USDA Forest Service, Rocky Mountain Experiment Station in Fort Collins, Colorado, for the major forest types of the central and southern Rocky Mountains (USFS Regions 2 and 3).

In Fig. 11, the source data from 4334 stands in USFS Regions 2 and 3 are graphed with the overlay of a Gingrich-style stocking chart for ponderosa pine (truncated at 1200 trees per acre). In addition, the "**minimum** attributes" from RM-217 Table 5 are shown in Fig. 11 with cross-diagonal fill as bounded by the minimum values for ponderosa pine with site index >= 55: trees per acre >= 30, mean DBH >= 22 inches, and total basal area >= 140 ft^2/ac. Goshawk nest stand criteria are similarly graphed for mixed conifer, aspen, Engelmann spruce-subalpine fir and piñon-juniper forest types in Figs. 12-15.

Opposite page:

Fig. 11. Ponderosa pine stocking chart for USFS Regions 2 and 3 combined.

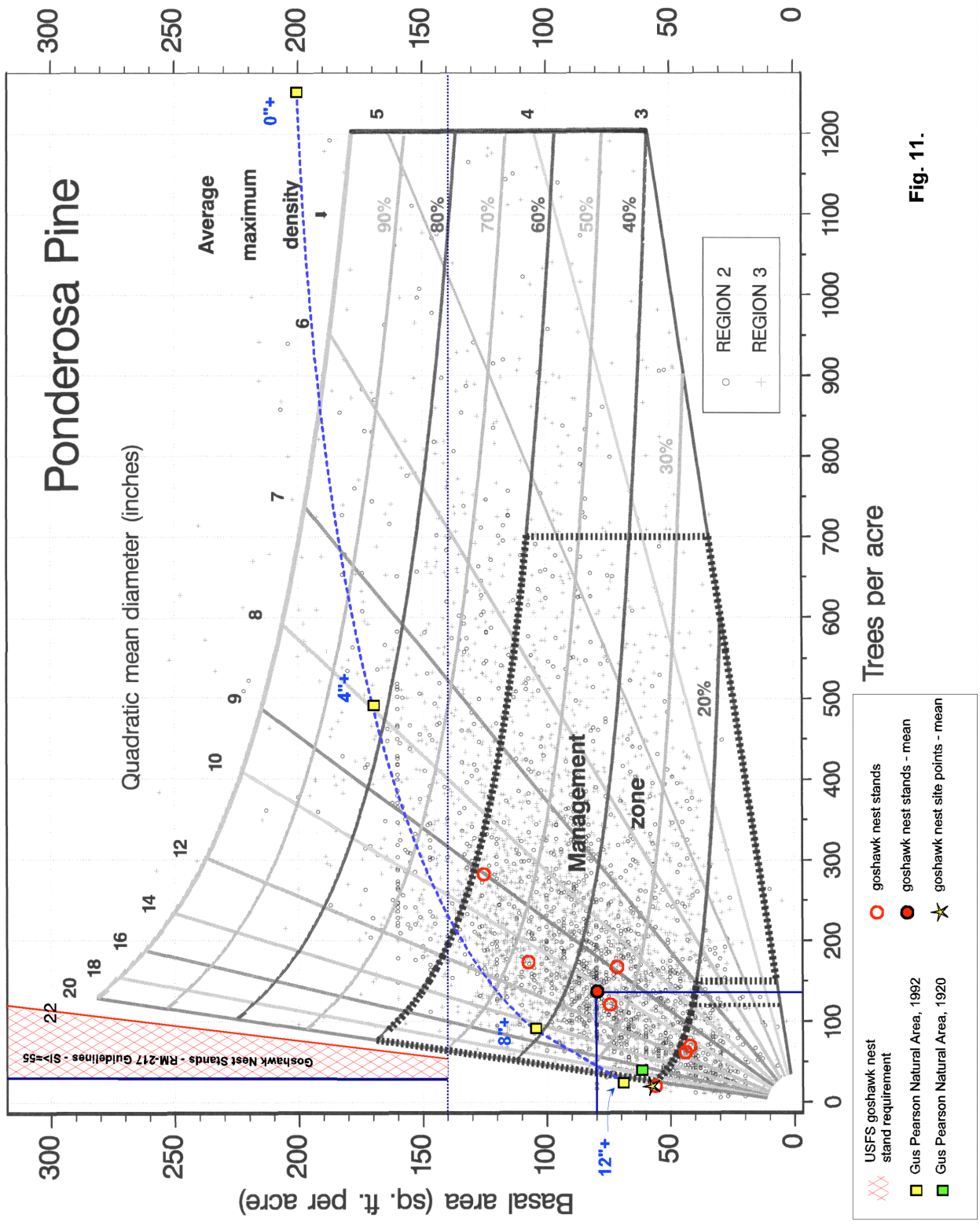
Ponderosa Pine
Quadratic mean diameter (inches)
Average maximum density
0"+
4"+
8"+
12"+
90%
80%
70%
60%
50%
40%
30%
20%
Management zone
REGION 2
REGION 3
Basal area (sq. ft. per acre)
Trees per acre
Goshawk Nest Stands - RM-217 Guidelines - SI>=55
USFS goshawk nest stand requirement
goshawk nest stands
goshawk nest stands - mean
goshawk nest site points - mean
Gus Pearson Natural Area, 1992
Gus Pearson Natural Area, 1920

Fig. 11.

Opposite page:

Fig. 12. Mixed Conifer stocking chart for USFS Regions 2 and 3 combined.

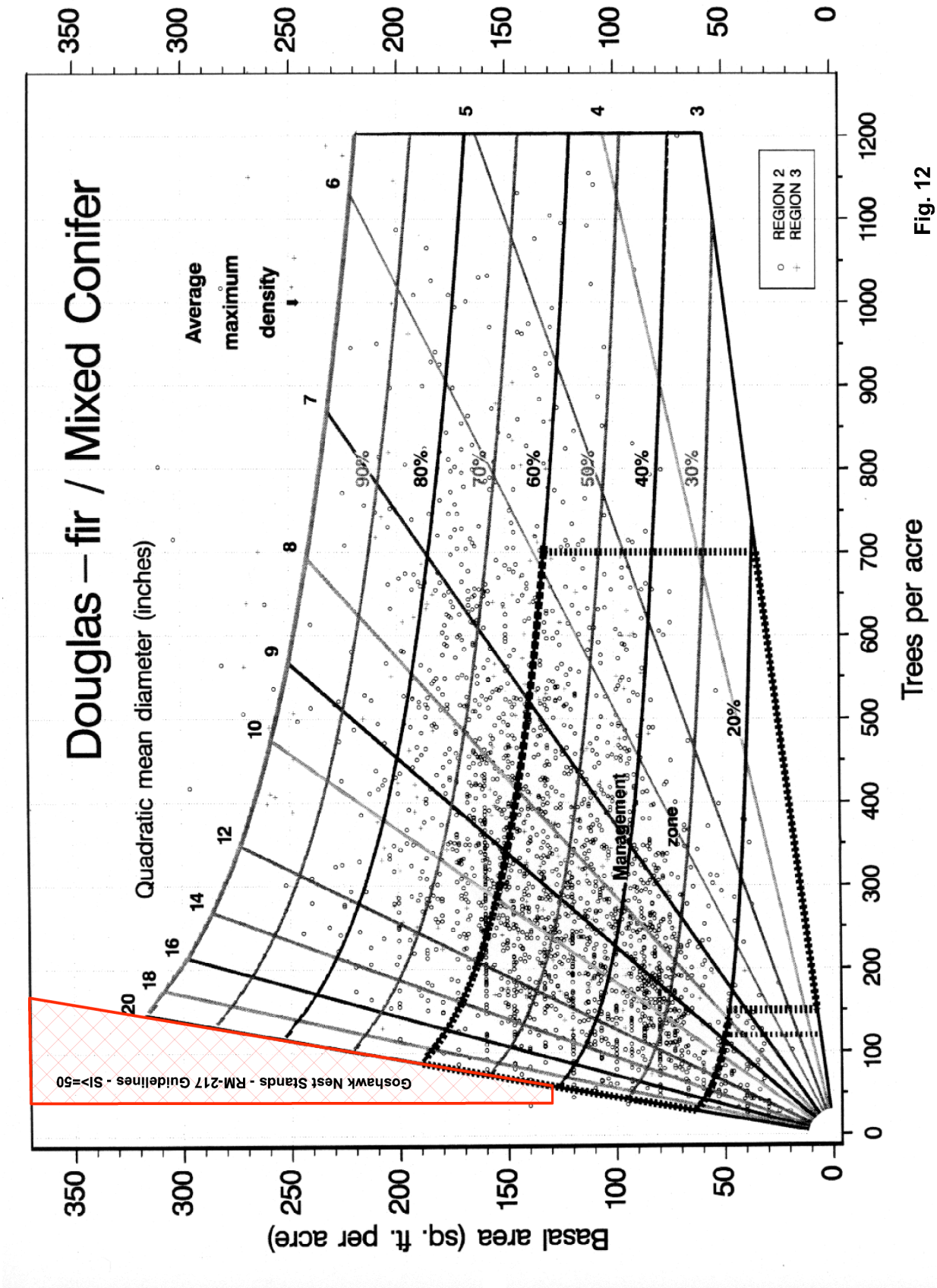
Douglas – fir / Mixed Conifer
Quadratic mean diameter (inches)
Average maximum density
Management zone
Goshawk Nest Stands - RM-217 Guidelines - SI>=50
REGION 2
REGION 3
Basal area (sq. ft. per acre)
Trees per acre
90%
80%
70%
60%
50%
40%
30%
20%

Fig. 12

Opposite page:

Fig. 13. Aspen stocking chart for USFS Regions 2 and 3 combined.

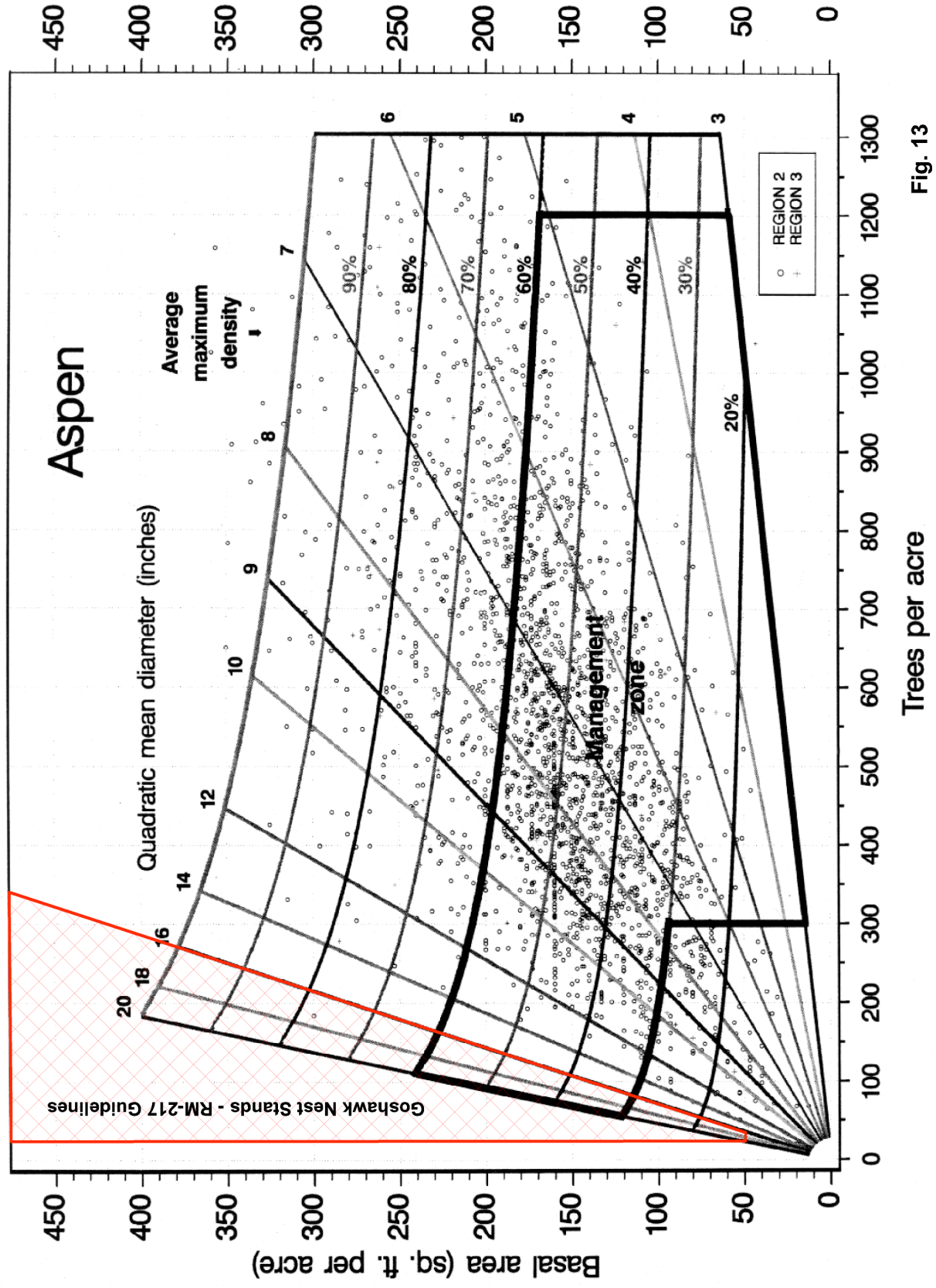
Aspen
Average maximum density
Quadratic mean diameter (inches)
Management zone
Goshawk Nest Stands - RM-217 Guidelines
REGION 2
REGION 3
Basal area (sq. ft. per acre)
Trees per acre

Fig. 13

Opposite page:

Fig. 14. Engelmann Spruce/Subalpine Fir stocking chart for USFS Regions 2 and 3 combined.

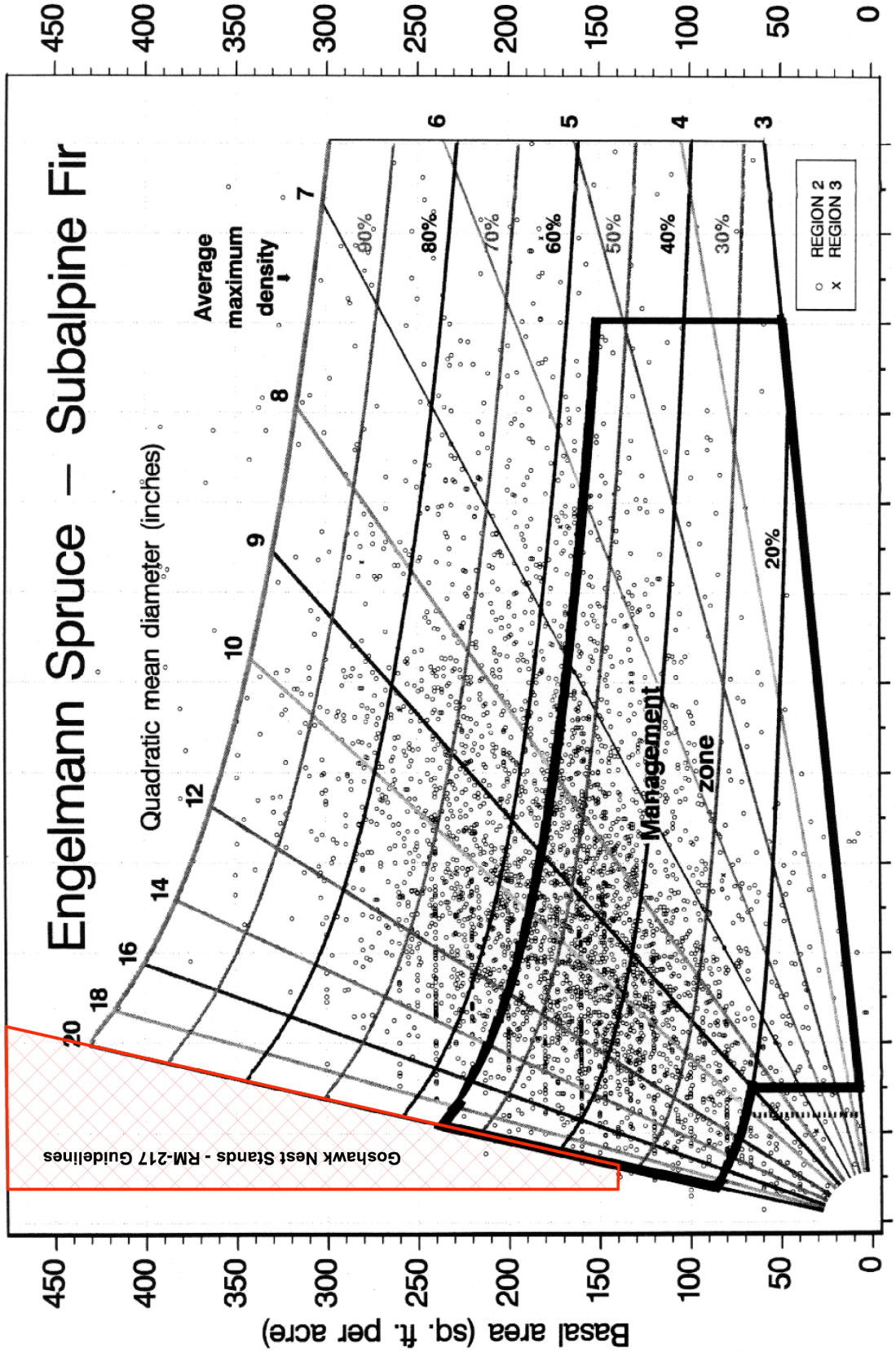
Engelmann Spruce – Subalpine Fir
Quadratic mean diameter (inches)
Average maximum density
Management zone
Goshawk Nest Stands - RM-217 Guidelines
REGION 2
REGION 3
Basal area (sq. ft. per acre)
Trees per acre

Fig. 14

Opposite page:

Fig. 15. Piñon-Juniper stocking chart for USFS Regions 2 and 3 combined.

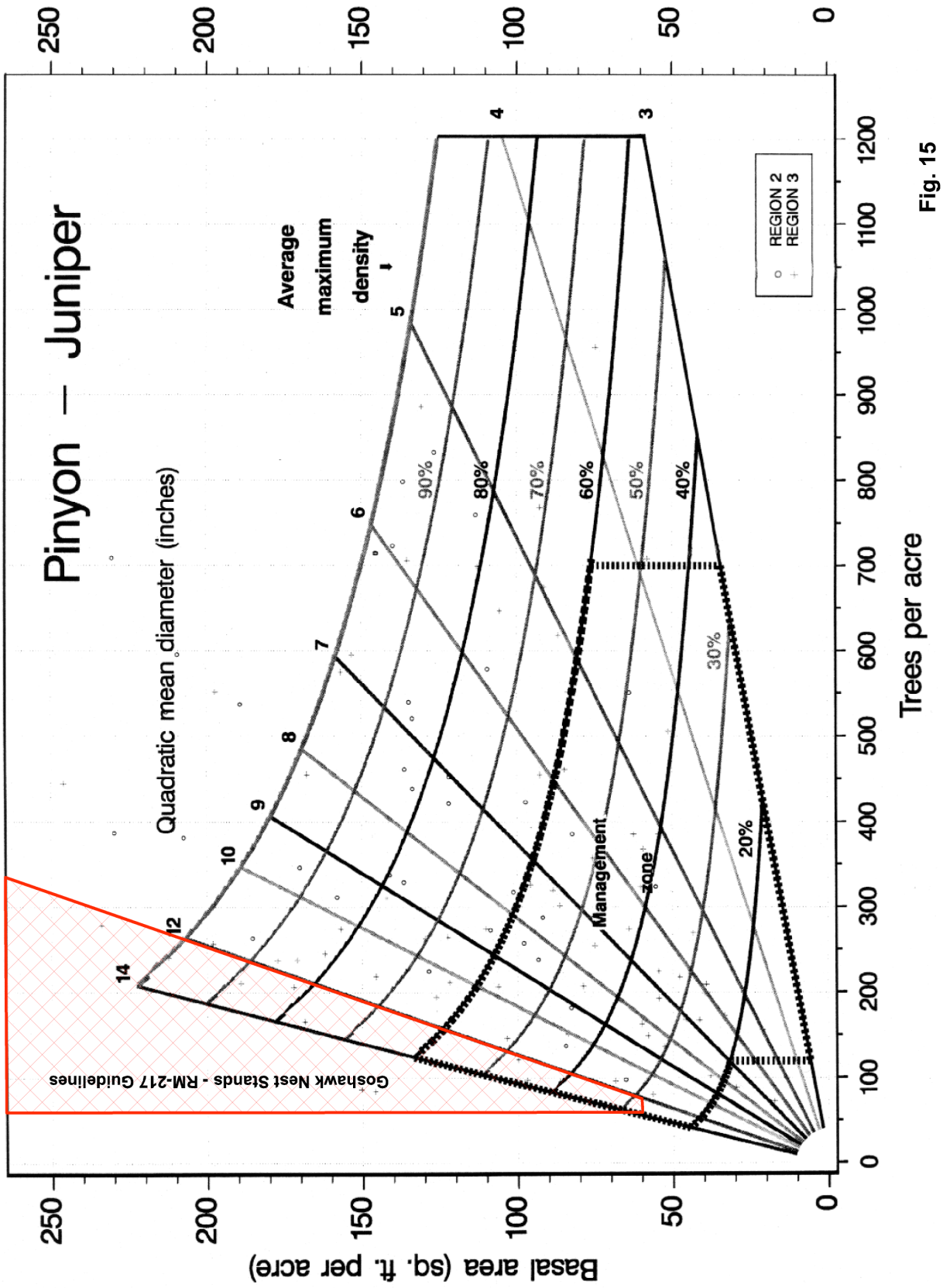
Pinyon – Juniper
Quadratic mean diameter (inches)
Average maximum density
Goshawk Nest Stands - RM-217 Guidelines
Management zone
REGION 2
REGION 3
Basal area (sq. ft. per acre)
Trees per acre
90%
80%
70%
60%
50%
40%
30%
20%

Fig. 15

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For all five forest types, there is no conformity between existing forest stand characteristics across Regions 2 and 3, and the goshawk nest stand criteria demanded by the GSC.

The required nest stand structural attributes in RM-217 Table 5 are incorrect and unattainable.

Also in Fig. 11, red circles (rings) show the stocking attributes of 7 goshawk nest stands containing goshawk nest trees in northern Arizona, from a 1991 U.S. Forest Service analysis of stand inventory data on the Kaibab National Forest (unpublished data and analysis on file, USDA Forest Service, Rocky Mountain Experiment Station, Fort Collins, CO). For each stand, the grid of sample points was located by placing one point at the nest tree, and remaining points were established using a systematic grid as is standard for Stage II stand exams.[4] In Fig. 11, note the location of goshawk stands (red rings) relative to (1) the bulk of the stand data, (2) the Management Zone, and (3) the GSC minimum nest stand requirements. It is quickly apparent that even goshawks may find the RM-217 nest stand requirements to be particularly repulsive.

The solid red circle in Fig. 11 shows the mean condition of the sample points from the goshawk nest stands (BA=80, TPA=138). Both mean conditions and individual stands fall far short of the minimum 140 ft^2/acre. Even for the minimum of 120 ft^2/acre and mean diameter of 16 inches designated by the GSC for stands with a site index less than 55, both existing inventory (stocking chart) data and actual sampled goshawk nest stands do not meet required conditions.

The yellow star in Fig. 11 shows the mean condition of the nest tree (site) sample points from the goshawk stands. Noting, with caution, that this is a mean point sample condition plotted with stand data

[4] The purposeful location of one stand inventory point at nest trees biases stand-level statistical inferences toward nest site conditions, but allows for valid comparisons of mean nest site characteristics vs. mean stand conditions away from nest sites. The USFS analysis demonstrated that nest sites differed from non-nest site inventory points as follows: nest site points had significantly larger mean diameters, lower trees per acre (TPA), larger mean tree heights, and larger mean minimum diameters. Basal area was not significantly different at nest sites compared to non-nest site points. For the discussion that follows in the main text, including related figures, where stand averages include the points located at nest trees, the bias toward nest site conditions can be expected to bias mean stand-level characteristics (when the nest site point is included) toward larger diameters and taller trees, with lower mean stocking in smaller diameter classes. Therefore, *actual* mean nest stand conditions derived from randomly located systematic grids would be expected to produce lower mean stand diameters, lower mean tree heights and higher stocking in smaller diameter classes. In Fig. 11 of this petition, a proper accounting for the sampling bias would cause mean goshawk nest stand conditions to become even further removed from the required minimum nest stand conditions in RM-217. Referring then to Fig. 11, results from randomly located sample grids, for both individual goshawk nest stands, and for the means for all sampled goshawk nest stands, would be shifted slightly to the right, reflecting both higher true mean TPA and lower true mean diameters. Because basal area was the same for nest sites vs. non-nest site sample points, the expected values for basal area would remain unchanged, and no vertical shifts would be expected. The mean values for goshawk nest sites, shown as a star in Fig. 8, would be unaffected. The bias associated with the purposefully located systematic sample grids when resulting inventory data is used to summarize stand-level conditions is of no contadictory consequence relative to the location of the bounds shown from RM-217 for minimum required nest stand characteristics.

in Fig. 11, even the goshawk nest sites fall far short of the RM-217 nest stand minimum requirements.

For comparative purposes, data from the Gus Pearson Natural Area, discussed in Section VI of this petition, is plotted on Fig. 11 in the upper right, at approximately 1250 trees per acre and 200 ft^2 of basal area per acre. Removing all trees below 12" DBH (diameter at breast height) would place the stand quite close to both the mean sampled nest point condition denoted by the star, and the 1920 condition at GPNA (in stocking, but not in terms of stand structure). It is clear that removing the understory at GPNA moves the stand closer to even-aged conditions; closer to sampled goshawk nest stand conditions but with greater mean diameters, and particularly toward sampled goshawk nest site conditions; and, away from the minimum RM-217 nest stand conditions as shown by the dotted-line trajectory in Fig. 11.

Because in RM-217 the GSC failed to disclose how the required minimum nest stand characteristics were derived, it is not possible to know precisely how the nest stand structural attributes could be so grossly in error. However, a review of literature cited in RM-217 shows that a failure to respect targeted populations in original research is the primary cause of the error.

On RM-217 p. 13, 13 references are cited to support "high tree canopy cover", "high density of large trees", and tree height, diameter and canopy closure minimum requirements in RM-217 Table 5, p. 14. The 13 references are listed in Table 8 below. Attempts to secure all 13 references were made for this petition; four are theses and were not successfully obtained, as was the case for one project report (McGowan (1975)). Of the remaining 8 references, 6 explicitly state that nest sites were targeted for sampling. Of these six, five provide actual nest site size, and the mean nest site area (plot size, among studies) is 0.78 acres (actual plot sizes of 0.1, 0.2, 0.31, 0.35, and 2.96 ac). Explanations for sampling methods in two references (Kennedy (1988) and Reynolds et al. (1982)) are unclear and are biased toward nest site conditions. (See Appendix 3, sections A3.13.2 and A3.13.3, for discussion of sampling methods in Kennedy (1988) and Reynolds et al. (1982).)

Thus, for the cited references successfully located and reviewed, most (6 of 8) targeted small nest sites, and their direct citation for reference and usage in RM-217 indicates study results were incorrectly extrapolated to 30-acre nest stands.

One of the 8 references (Crocker-Bedford and Chaney (1988)) targeted nest stands for only canopy cover extrapolations - canopy cover measurement and extrapolation methods are biased (see Appendix 3, A3.13.2 of this petition). Measures of stand stocking and structure were limited to the 2.96 ac nest sites.

The cited literature used to support "**minimum** attributes required for goshawks on locations with 'low' and 'high' site productivity" (RM-217, p. 13) cannot be applied to either nest stands or nest areas, which would require significant extrapolation beyond the actual targeted populations from the described samples. Further, as discussed in footnote 1 on p. 12 of this petition, and for nest site

diameter distributions in Fig. 3 of this petition, small-plot nest site characteristics may differ significantly from stand conditions, demonstrating why extrapolation beyond targeted populations is dangerous and a violation of an elementary principle of statistical sampling and inference.

On RM-217 p. 6, nest areas are described as follows:

> "Nest areas are typified by one or more stands of mature or old trees and dense forest canopies."

It is errant to expand nest site data from cited literature to either nest stands or nest areas - noting that nest stands are listed as 30 acres in size on RM-217 Table 2, p. 7, 20-25 acres on RM-217 p. 6, and 30 acres on RM-217 p. 22.

The failure of minimum nest stand criteria in RM-217 Table 5, p. 14, to correlate with real-world forest stand conditions (Figs. 11-15, this petition) and with nest stand conditions of known goshawk nest sites (Fig. 11) is caused by a failure of the GSC to respect target populations in cited references.

In RM-217 Table 5, p. 14, "Trees/Acre" is modified via footnote to limit values to the "number of trees in the main canopy". The "main canopy" is defined in the RM-217 glossary on p.88 as "the dominants and codominants (overstory trees) in a stand". The term "Main canopy" is of nebulous utility. In addition, no reference reviewed for this petition was found to have limited sampling to, or reported results for, dominant and codominant trees (see related data in Table 8, this petition, far right column). The source and reasoning for this qualifying criteria is not explained in RM-217, and the conclusions in this section regarding required minimum nest stand characteristics remain unchanged.

Also in RM-217 Table 5, mean stand diameter ("Mean DBH/DRC") and stand age ("Age") requirements are modified by a footnote:

> "Arithmetic average of the ages of dominant and codominant trees in the stand; DBH = diameter at breast height; DRC = diameter at root crown"

The first phrase in the footnote applies to "Age", and the second phrase refers to "Mean DBH/DRC".

A review of available references cited in RM-217 in support of required minimum conditions in RM-217 Table 5 found that no authors reported measuring tree ages. See Table 8, far right column, in this petition.

Similarly, no cited authors were found to have reported mean nest stand diameters with their results (see Table 8 of this petition, second column from the right). The method for calculation of mean stand diameter is apparently delegated to the reader.

Mean stand diameter may be calculated as either an arithmetic mean or a quadratic mean - the diameter of the tree of average basal area

(**Smith et al. (1997)**, p. 117). An arithmetic mean produces a descriptor highly sensitive to stand structure. Quadratic mean diameter is less sensitive to varied diameter distributions.

Because the data sources and methods used to develop the minimum structural attributes in RM-217 Table 5 are not explained, it is not possible to verify the values and replicate results. A review of cited and available references failed to produce any data to support mean stand diameter and age conditions in RM-217 Table 5 for goshawk nest stands.

Table 8. Target populations from cited literature for nest area characteristics listed on RM-217, p. 13.

Reference Name	Cited on RM-217, p. 13: "high tree canopy cover and a high density of large trees"(1)	Cited on RM-217, p. 13: "tree height, diameter, and canopy closure..."(2)	Reference successfully obtained for review?	Crown Cover Discussed?	Original Forest Stocking Research?	Target Population	Notes	Mean Stand DBH(4)	Age of Dominants/ Codominants(4)
Bartelt 1974(3)	x		No (thesis)	---	---	---	---		
Crocker-Bedford and Chaney 1988(2)	x	x	Yes	Yes	Yes	2.96 ac nest sites and 20-25 ac nest stands	Indirectly extrapolated canopy cover from nest sites to 20-25 ac nest stands using aerial photos. Variable-radius points on nest sites only.	N/A	N/A
Hall 1984(3)	x		No (thesis)	---	---	---	---		
Hayward and Escano 1989	x		Yes	Yes	Yes	0.1 ac nest sites	Hayward and Escano warned that "The design of the survey was not intended to test for habitat selection." (p. 478)	N/A	N/A
Hennessy 1978(3)	x		No (thesis)	---	---	---	---		
Kennedy 1988(2)	x	x	Yes	No	Yes	Unclear	Unusual sample design of variable nest size at least 124 acres (50.2 ha) in size, biased toward nest site condition. See Appendix 3, A 3.13.3, this petition	N/A	N/A
McGowan 1975(3)	x		No; copy request not acknowledged	---	---	---	---		
Moore and Henny 1983(2)	x	x	Yes	Yes	Yes	0.20 ac nest sites		N/A	N/A
Patla 1990(2)		x	Yes	Yes	Yes	.31 ac nest sites		N/A	N/A
Reynolds et al. 1982(2)	x	x	Yes	Yes	Yes	Unclear; biased toward nest tree and major prey-plucking area	Target stand size indeterminate. Nest stand sizes not provided, nor were precise methods for determining nest stand boundaries described; 6 "point-centered-quarter" points per "nest stand", of which 2 were deliberately located - one at the major prey-plucking area and one at the nest tree.	N/A	N/A
Saunders 1982(3)	x		No (thesis)	---	---	---	---		
Shuster 1980	x		Yes	No; see Table 2, this petition	Yes	nest site	Shuster did not specify plot size or stand density measurement methods. However, he did specify he concentrated on "nest sites" rather than "nest stands".	N/A	N/A
Speiser and Bosakowski 1987	x		Yes	No; see Table 2, this petition	Yes	.35 ac nest sites		N/A	N/A

(1) RM-217, p. 13: "Goshawk nest stands have a relatively high tree canopy cover and a high density of large trees (Bartelt 1974, McGowan 1975, Hennessy 1978, Shuster 1980, Reynolds et al. 1982, Saunders 1982, Moore and Henny 1983, Hall 1984, Speiser and Bosakowski 1987, Crocker-Bedford and Chaney 1988, Kennedy 1988, Hayward and Escano 1989) (Table 5)."

(2) RM-217, p. 13: "Information on tree height, diameter, and canopy closure of goshawk nest areas in interior ponderosa pine and mixed-species forests is provided by Reynolds et al. (1982), Moore and Henny (1983), Crocker-Bedford and Chaney (1988), Kennedy (1988), and Patla (1990)."

(3) All theses were formally requested via Interlibrary Loan; none were made available.

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Failure to identify and abide by target populations for goshawk foraging areas

In RM-217 Table 1, p. 7, various attribute values are specified as "desired forest conditions" for foraging areas. The GSC failed to explain how these values were derived, and it did not attempt to explain how results from sampled target populations in supporting literature could be extrapolated for application to the 5,400 acre foraging areas (area from RM-217 Table 2, p. 7).

Canopy cover requirements in RM-217 Table 1 offer one example of the importance of abiding by targeted populations while underscoring the inappropriateness of extrapolating and applying study results beyond the intended scope in underlying research.

In Table 2 of this petition, 25 canopy cover references are listed that are directly or indirectly cited in RM-217 in support of canopy cover requirements. Of these 25 references, six offer original canopy cover research for the GSC's selected goshawk prey species and are listed in Table 9 (this petition).

Referring to Table 9, 5 of 6 canopy cover references targeted either nest sites or caches for sampling, with plot sizes ranging from 0.07 to 0.20 acres. None of the studies identified forest stands as the population of interest. In fact, Hayward and Escano (1989) explicitly warned on p. 478:

> "The design of the survey was not intended to test for habitat selection."

For these five references, inferences can only be made about the specific microsite conditions identified for explicit plot sizes utilized. Because the plots were located to sample and describe forest attributes for specific attributes unique to each study, any extrapolation or application of inferences beyond the targeted population (nest sites, caches) will yield biased results. An example of such a bias was provided above for nest site characteristics versus nest stand requirements.

Referring again to Table 9, States (1985), the sixth and last listed reference, identified his targeted population on p. 271 as follows:

(5) "Monthly sporocarp production was measured in two stands, each with a mixture of two age-vigor classes, mature-yellow pine and young-blackjack pine."

States (1985) sub-sampled the two stands, but did not elaborate on a stand definition, and he did not attempt to select a sample of stands from a larger targeted population of identified stands of interest. His work is a case study for which extrapolation to forest stands and landscapes must be viewed with care and caution.

None of the authors listed in Table 9 attempted in any way to sample landscape conditions, nor do any of the authors suggest that inferences made can be applied beyond the targeted and sampled populations of interest.

The canopy cover requirements for foraging areas in RM-217 apply at the landscape level, or 5,400 acres as listed in RM-217 Table 2, p. 7. The GSC failed to explain how inferences in referenced literature could be extrapolated from unique and intentionally selected target populations to stand conditions, let alone the landscape-level requirements of RM-217 Table 1. As discussed above, a review of original research cited in RM-217 in support of desired canopy cover attributes shows their research cannot and must not be applied to landscape-level conditions. Therefore, foraging area requirements in RM-217 are incorrect, biased and lack substantive support from cited references.

Table 9. Identified target populations and plot size in original goshawk prey species/canopy cover research cited in RM-217 in support of foraging area canopy cover requirements.

Reference Name	CC Citing Page in RM-217	CC instrument	Target Population	Plot size (ac)
Hayward and Escano 1989	13	spherical densiometer	nest sites	0.10
Mannan and Smith 1991	71	spherical densiometer	caches	0.07
Moore and Henny 1983	13	spherical densiometer	nest sites	0.20
Patton and Vahle 1986	72	spherical densiometer	caches	0.10
Patton 1975	75	spherical densiometer	nest sites	0.10
States 1985	18, 74, 75	ocular/classes/other	2 stands	0.01

In addition, in RM-217, extrapolation from goshawk prey literature resulted in RM-217 requirements that stand structure in foraging areas be directed toward uneven-aged conditions across forest stands and the forested landscape, as shown in passages (5) through (11) and related discussion in Section VI (VSS) of this petition. In RM-217, no explicit citations to references were made to justify this large-scale directive in forest management direction, including an abandonment of even-aged management practices. As discussed in this section, cited original research for goshawk prey habitat reviewed for this petition focused on small-scale forest conditions around intentionally selected attributes of interest. Extrapolation beyond such targeted populations to forest stands and forest landscapes is biased, unjustified and incorrect.

2. Explanation of noncompliance with OMB and/or USDA Information Quality Guidelines.

OMB Guidelines: Goshawk nest stand requirements and foraging area recommendations in RM-217 are incorrect and biased. Therefore, RM-217 violates the objectivity requirements for presentation as defined in V.3.a, and for substance, as defined in V.3.b. The presentation of nest stand requirements and foraging area recommendations is inaccurate, unclear, incomplete and biased; the substance is inaccurate, unreliable and biased. Further, the information presented cannot be substantially reproduced, as defined in V.10, and the development of nest stand requirements and foraging area recommendations in RM-217 is not transparent.

USDA Guidelines for Regulatory Information are violated in RM-217 as evidenced by the failure to "use sound analytical methods in carrying out scientific and economic analyses", and specifically, the failure to respect target populations in cited references is an unacceptable procedure in scientific analyses.

3. Explanation of the Effect of the Alleged Error

The effect of the errors in nest stand requirements is to require U.S. Forest Service forest managers to target high forest stand stocking levels in goshawk nest stands that will not, and cannot, be attained.

The effect of the errors in foraging area recommendations is to require small and highly-targeted plot conditions to be extrapolated across stands and landscapes. One such extrapolated parameter is canopy cover. Already shown to be biased in Section IV of this petition, true canopy cover may indeed be higher on small plots located purposefully to measure specific attributes, as corroborated in several RM-217 references. Extrapolation beyond small plots and targeted populations thus forces forest managers to target excessively high, unwarranted, incorrect and uncorroborated forest stocking levels.

In both instances above, high and incorrect canopy cover/stand stocking level targets reduce opportunities to actively manage forests in a manner that produces quality timber products, improves forest health, reduces fire hazard, improves wildlife habitat and accommodates recreational activities. Reduced timber harvests negatively impact local and regional economies, causing harm to communities and the forest products sector, and hence to the requestors. Increased management costs associated with the failure to respect targeted populations in cited references decrease financial returns to the U.S. Forest Service, requiring increased costs to be passed to taxpayers that fund the agency. The requestors pay federal taxes and/or represent others that do.

Further, the resultant nest stand and foraging area requirements in RM-217 are likely to contradict goshawk needs. Retention of errant high stand stocking and canopy cover levels, errant even-aged nest stand structure, and incorrect extrapolations of forest stand structure may cause reductions in goshawk populations, negatively impacting ecosystem

function and degrading the requestors' enjoyment of forest amenities on National Forests.

VIII. Grazing/forage utilization restrictions

1. Explanation of substandard quality issues, with supporting documentary evidence.

The restrictions on forage utilization are poorly referenced and, subsequently, incorrect and unjustifiably restrictive.

Just two cited references are used in RM-217 to justify forage utilization restrictions: one is a substandard citation that does meet any reasonable expectation for a supporting reference. The second reference directly contradicts the RM-217 citing statement. See Appendix 3 of this petition, section A3.22.1, for detailed discussion.

2. Explanation of noncompliance with OMB and/or USDA Information Quality Guidelines.

OMB Guidelines: In RM-217, recommended forage utilization restrictions violate the objectivity requirements for presentation as defined in V.3.a, and for substance, as defined in V.3.b. The presentation of forage utilization restrictions is inaccurate and unclear; related substance is inaccurate, unreliable and biased. Further, the forage utilization restrictions cannot be substantially reproduced, and as defined in V.10, the development and application of forage utilization requirements and recommendations in RM-217 is not transparent.

3. Explanation of the Effect of the Alleged Error

The effect of the errors is to require U.S. Forest Service forest and range managers to dramatically reduce forage utilization and related grazing activities. Reduced grazing negatively impacts local and regional economies, causing harm to communities, to both the agriculture and forest products sector, and hence to the requestors.

IX. Road densities

Though the GSC repeatedly required and recommended that roads be "minimized", no supporting citations or other information were provided to support the mandate.

RM-217 Table 2, p. 7

(1) Management recommendations for roads in Nest Areas, PFAs and Foraging Areas: "Minimum density" (uncited)

RM-217 p. 22

Management recommendations for nest areas:

(2) "Manage road densities at the lowest level possible to minimize disturbance in the nest area." (uncited)

RM-217 p. 24

Management recommendations for post-fledging family area:

(3) "Manage road densities at the lowest level possible to minimize disturbance in the PFA." (uncited)

RM-217 p. 28

Management recommendations for post-fledging family area:

(4) "Manage road densities at the lowest level possible to minimize disturbance in the foraging area." (uncited)

Further, there is no discussion of road densities in RM-217 beyond the above uncited recommendations.

At least two RM-217 references cited elsewhere in the document discussed an apparent positive correlation between the location of goshawk nests and close proximity to roads and trails, but the passages were not disclosed or discussed in RM-217:

Speiser and Bosakowski (1987), p. 392:

(5) "Despite our intensive off-trail searches, goshawk nests were found closer to woods roads (or discernable trails) than random sites: six nests were very close (<22 m) [72 feet] and 11 out of 22 were within 65 m [213 feet]. An association with woods roads and trails was noted at other nests of goshawks (Gromme 1935, Hald-Mortensen 1974, Heintzelman 1979) while clearings (Dementiev and Gladkov 1966, Shuster 1980) were considered important at others. In our study, woods roads often represented the only break in deep contiguous timber. We

believe that they may serve as landmarks providing orientation to the nest. Perhaps nest trees are difficult to find in areas without obvious landmarks, thus favoring the use of nests that are constructed near them. In dense contiguous timber, woods roads also seem to resemble corridors perhaps aiding the hawks with improved flyway space. On several different occasions, we observed goshawks flying, perching and plucking prey along woods roads in the study area. Although woods roads did not exist prior to European settlement, we believe that goshawks are opportunistic, favoring these habitat modifications where present. Moreover, there are numerous examples (published and unpublished) of other raptors which have exploited various man-created habitats, e.g., sanitary landfills, farmland, cemeteries, golf courses, and highway shoulders."

Reynolds (1989), p. 97:

(6) "Nest trees are frequently the largest tree in the stand and are frequently adjacent to small breaks in the canopy created by a fallen tree, old logging trail, or the shading of the large nest tree (Shuster 1980; Reynolds et al. 1982; P. Hall, unpubl. data; Speiser and Bosakowski 1987)."

The citation of Speiser and Bosakowski (1987) by Reynolds (1989) is incorrect because it diminishes the roads correlation discussed in detail by the original authors. See passage (5).

A discussion of the goshawk nest/road correlation is presented in **U.S. Fish and Wildlife Service (1998)**. The full passage is included below to maintain the relevance of the information for the reader. The objective here is not to introduce new information; rather, the purpose is to note the citations to original research with goshawk nest/road discussion, available before 1992, that should have been readily available to the GSC.

U.S. Fish and Wildlife Service (1998), p. 14-15 (pdf version):

(7) "Forest Openings

"Goshawks often nest close to forest openings such as meadows, forest clearings, logging trails, dirt roads and fallen trees (Gromme 1935, Reynolds et al. 1982, Hall 1984, Erickson 1987, Hayward and Escano 1989). In California, an average of one forest opening was present within 15 m (49.5 ft) of goshawk nests and averaged 113 m (1,208 ft) in size (Hall 1984). In South Dakota, canopy openings accounted for approximately 10% of the nest territory (Bartelt 1977); only two sites were not associated with an opening. Another South Dakota study found that all goshawk nests were near either old logging roads (78.6%) or forest openings (21.4%, Erickson 1987); the mean distance from the nest tree to either type of opening was 73.9 m (242 ft) (range 16.9 - 215 m; 55 - 703 ft). In California, goshawks nested an average of 85.3 m (279 ft) from medium-use roads (Saunders 1982).

"The function of forest openings near nests is unclear. They may serve to increase access to the nest or to aid in locating nests. Erickson (1987) observed male goshawks on several occasions returning high over the forest canopy with food, and then dropping into an opening or trail to deliver the prey to the female; he believed that openings and trails were used as access corridors to the nest. In Colorado, Shuster (1980) found that each of 20 goshawk nests were within 350 m (1,145 ft) of a 0.4 ha (1 ac) or larger opening. These were natural meadows that supported populations of ground squirrel prey."

Thus, the USFWS reported on road proximity data collected by Erickson (1987) in South Dakota, and by Saunders (1982) in California.

In RM-217, four recommendations are made to "minimize" road densities, without explanation or discussion.

For this petition, three pre-1992 original research publications were found that present data and discussion regarding the goshawk nest/roads issue, and one pre-1992 publication was located that mentions the topic with cited works. This was the result of incidental discovery, and an intentional literature search on the goshawk nest/roads topic was not initiated.

However, it is clear relevant information contrary to the road minimization recommendation in RM-217 was available prior to 1992. The failure in RM-217 to provide or discuss any relevant information, whatsoever, indicates there was no supporting information used to create the roads minimization requirement.

2. Explanation of noncompliance with OMB and/or USDA Information Quality Guidelines.

OMB Guidelines: In RM-217, recommended road restrictions violate the objectivity requirements for presentation as defined in V.3.a, and for substance, as defined in V.3.b. The presentation of road minimization recommendations is inaccurate and unclear; related substance is inaccurate, unreliable and biased because none was presented. Further, the roads restrictions cannot be substantially reproduced, and as defined in V.10, the development and application of road minimization recommendations in RM-217 is not transparent. The failure to introduce contrary and readily available research, a violation of transparency requirements, further degrades publication quality.

3. Explanation of the Effect of the Alleged Error

The effect of the error is to require U.S. Forest Service forest managers to dramatically reduce the number of existing roads and avoid construction of new roads. Minimization of road densities can only be interpreted as a directive to "approach zero". Minimization of road densities reduces access on National Forests for multiple uses, including timber harvest, range management and access to grazing allotments, fire suppression, recreation, and other forest uses. The effect is to cause harm to communities, to the agriculture, forest products and recreation sectors, and hence to the requestors.

Further, in the context of the cited roads discussion above, consideration should have be given to an alternative concept - decreased roads densities may negatively impact goshawk populations. If so, the RM-217 recommendation to minimize roads densities may be contrary to the overall objective of sustaining goshawk populations. Reductions in goshawk populations would impair the ability of the requestors to enjoy the amenities of National Forests, and cause

further restrictions to be placed on the natural resources sector. This effect would cause further harm to the economic and social interests of the requestors.

X. RM-217 citations

1. Explanation of substandard quality issues, with supporting documentary evidence.

Numerous erroneous statements, low-quality supporting citations and misrepresentation of cited references were used in RM-217. The quantity of these problems seriously degrades the quality of the publication. The good faith requested of the reader by the authors in their ability to reliably convey supporting information, is, indeed, lost.

Citations reviewed for the topics in previous sections were often found to be incorrect or misleading. No attempt is made here to explicitly review all statements with citations in RM-217. However, the abundance of problematic citations creates a perception of diminished integrity and inadequate publication quality. The result is that no citation can be accepted at face value, and an accurate reading of RM-217 requires verification of all citations.

A selected subsample of problematic statements with supporting citations is included in Appendix 3 of this petition. Summaries of the Appendix 3 sections are provided below.

1) A3.10.1: A statement on RM-217 p. 10 provides that "other factors", including toxic chemicals, "could be involved" in purported goshawk population declines. The cited reference used to support the toxic chemical factor directly contradicts the statement.

2) A3.13.1: Nest size statement (20-25 acres) is a secondary citation; statement is not supported in original source.

3) A3.13.2: Nest stand canopy cover requirements are not supported by cited references.

4) A3.13.3: Minimum nest stand requirements are not supported by any of the cited references.

5) A3.13.4: Identification and definition of PFA is not supported by cited reference.

6) A3.15.1: VSS citation is not materially related to the cited reference. Through the citation, it was implied the source document would be authoritative and substantively supportive. One sentence and a diagram in a paper written on an unrelated topic cannot, and must not, be considered a valid supporting citation.

7) A3.18.1: Two cited references do not support the citing statement, and should not have been used. An explicit canopy cover requirement of 60%, and of "high canopy cover", are not based on the two citations: one study did not include canopy cover measurement, and the second did not specify canopy cover percentages.

8) A3.18.1: Explicit minimum canopy cover requirements for fungi production are incorrect, and incorrectly attributed to cited references. A cited study targeted just two forest conditions, but results are extrapolated for application to include all forest conditions.

9) A3.20.1: Of 10 citations included for a single statement, at least five are substandard and fail to support the citing statement.

10) A3.22.1: Forage utilization limitation citations (1) contradict the citing statement, and (2) are misrepresented as being relevant. Only two references are directly cited in RM-217 to support forage utilization limits, and they are the subject of this section.

11) A3.51.1: Multiple errors are incorporated into the goshawk prey table of RM-217 Appendix 2.

12) A3.54.1: American robin - the complete aversion to uncut stands in the cited reference is changed to an aversion to clearcuts.

13) A3.54.2: American robin - the complete aversion to uncut stands in a cited reference is changed to an abundance in uncut stands. Robins' preference for savannah and aversion to upland woodlands in Iowa is changed to an abundance in logged and unlogged forests, and low populations in clearcuts, of the southwestern United States.

14) A3.57.1: A blue grouse proclivity for large clearcuts and aversion to subsequent crown closure of regeneration is misrepresented in RM-217 with misleading and nebulous phrases such as "level of canopy cover" and "open canopies allow sufficient light penetration".

15) A3.57.2: Cited reference used in support of grazing ramifications statement does not mention grazing.

16) A3.63.1: A passage was copied from the cited reference and altered, including the insertion of a

"large diameter snags" phrase, hence credited to the cited author, without justification.

17) A3.63.2: Cited authors reported that hairy woodpeckers were not found in clearcuts. In RM-217, it was *not* reported that the subject clearcut was created to meet research hydrology objectives. The installed clearcut was the most "severe" treatment possible and included the removal of all timber, including snags.

18) A3.66.1: Crown density value not supported in cited reference.

19) A3.67.1: The stated northern flicker preference for snags larger than 20" DBH in stands that had never been logged is incorrect. The cited authors refer only to numerous small snags less than 6" DBH that had been created by fire and utilized by woodpeckers. The sampled stands had been previously logged, though not "extensively". This differs from the "never been logged" contention.

20) A3.67.2: Northern flicker response to research hydrology clearcut is misrepresented.

21) A3.68.1: Northern flicker aversion to clearcuts is incorrect. If secondary citations had not been used, and original studies consulted, the northern flicker densities in clearcuts would have been properly located and correctly reported.

22) A3.68.2: It is stated in RM-217 that red-naped sapsuckers "occur commonly in the diets of goshawks". RM-217 Appendix 2 shows red-naped sapsuckers comprised 0.5% of the goshawk diet in Oregon; 0% in New York/Pennsylvania; 0% in California; 0% in Arizona; and 0% in New Mexico. These data do not support the claim that red-naped sapsuckers are "common" in goshawk diets.

23) A3.71.1: Stated red squirrel cache site canopy cover is not supported by cited reference. The cited reference never mentions canopy cover, and no canopy cover measurement methods or results are reported.

24) A3.71.2: Stated Mount Graham red squirrel cache site canopy cover and sample size cannot be confirmed.

25) A3.72.1: The stated basal area requirement for red squirrel middens is "basal areas>=200 square

feet per acre". It is irrational and incorrect to report that a mean value listed in a cited reference is instead a minimum value. Stand diameters are similarly distorted.

26) A3.75.1: Cited Tassel-eared squirrel statistic is incorrect.

The statements summarized above and discussed in detail in Appendix 3 are each classified in corresponding sections by error categories. In turn, error categories are compiled in Table 10 below.

Table 10. General classification of problematic statements with citations in RM-217.

Category	Appendix 3 Section
Statement is not supported by cited reference(s)	A3.13.4 A3.15.1 A3.18.1 A3.20.1 A3.22.1 A3.57.2 A3.66.1
Cited reference is misrepresented	A3.13.1 A3.13.2 A3.13.4 A3.15.1 A3.18.1 A3.20.1 A3.53.1 A3.54.1 A3.54.2 A3.57.1 A3.63.1 A3.63.2 A3.67.1 A3.67.2 A3.68.1 A3.68.2 A3.71.1 A3.72.1
Statement contradicted by supporting reference	A3.10.1 A3.13.2 A3.15.1 A3.18.1 A3.20.1 A3.22.1 A3.54.1 A3.54.2 A3.67.1
Substantive errors incorporated into RM-217 decision tools	A3.13.2 A3.13.3 A3.18.1 A3.51.1 A3.63.1 A3.67.1 A3.68.1 A3.68.2 A3.71.2 A3.72.1 A3.75.1
Secondary and tertiary citations (Cited reference is not primary source.)	A3.10.1 A3.13.1 A3.18.1 A3.20.1 A3.57.1 A3.66.1 A3.68.1

2. Explanation of noncompliance with OMB and/or USDA Information Quality Guidelines.

OMB Guidelines: Errors in statements using supporting citations are a violation of the objectivity requirement as defined in V.3.a. Information presented in RM-217 is inaccurate, unclear and incomplete.

3. Explanation of the Effect of the Alleged Error

Errant statements using supporting citations degrade the quality of RM-217. Unless a reader is willing and able to access a large university or research library for reference information, and to invest time, effort and money in a research effort to verify cited references, the errant and substandard statements will be accepted as valid and correct. The result is that the errors described in previous sections of this petition may also be accepted as valid by readers. This harms the requestors by causing the public and interested/affected natural resource managers, of any skill, experience and knowledge, to believe RM-217 is correct as based on the implied validity and quality of included citations.

XI. Inherent Bias Reveals Lack of Objectivity for Whole Publication

1. Explanation of substandard quality issues, with supporting documentary evidence.

Lack of objectivity, clear evidence of bias and errors require withdrawal (retraction)

Collectively, the errors and bias revealed in Sections I-X above suggest that RM-217 was conceived, written and published with the intent to achieve preconceived and desired outcomes. Specifically, an explanation for these serious problems contained in RM-217 must lie in how the project was conceived and pursued. When RM-217 is viewed as a whole, the recommendations and analysis methods used were biased toward dramatically reducing, but not eliminating, active forest management and resource utilization, including limitations on forage utilization and roads.

The bias in crown cover methodology is a bias toward reduced timber management activities and a furtherance of elevated stocking targets. The inadequately conceived and poorly defined VSS forest development classification scheme is a tool for achieving extensive mature and overmature forest stand conditions that were derived as outcomes based on the incorrect extrapolation of goshawk nest site conditions and highly specific, localized microsite prey habitat conditions to whole forest stands and forested landscapes, as well as the incongruous selection and weighting of goshawk prey species to favor them. VSS, the sudden appearance of PFAs, misapplied extrapolated inferences from tightly defined target populations in cited literature, and incorrect inferences from prey habitat literature are used to support a bias against both even-aged management, and against true uneven-aged management. Unfathomable errors, such as the complete and contradictory error for American robin habitat (Appendix 3, section A3.54.1, this petition) that directly portrays an aversion to uncut stands as an aversion to clearcuts, reinforce the GSC bias and were used inappropriately to justify outcomes. Suspect distortions, such as the blue grouse proclivity for large clearcuts and aversion to subsequent crown closure following regeneration, are poorly masked in elusive statements about levels of canopy cover and sufficient light penetration (Appendix 3, section A3.57.1). The roads minimization recommendation is the final tool needed to restrict forest access and management operations. Together, for the GSC, these formed a collective justification for sharp restrictions on silvicultural practices that was not documented or shown in RM-217 as necessary for the management of goshawks and goshawk prey species. The plethora of invalid, incorrect or misrepresented citations suggests that unusual efforts were made to achieve desired outcomes.

In RM-217, the GSC attempted to disguise an obvious lack of objectivity by relying on preconceived notions in a framework of gestalt biology implemented through qualitative decision models lacking in transparency. The hazard of emphasizing gestalt processes in a precautionary principle framework, where perception supercedes empirical evidence, is that the results and conclusions may one day

be proven incorrect, and meanwhile great harm and damage will be incurred by those forced to rely on what are otherwise accepted as truths in a publication commonly and superficially deemed, as a matter of dogma, to be substantive and complete. A gestalt approach lacks objectivity, yet it was the driving force behind RM-217.

RM-217, as a whole, violates the objectivity requirements of FDQA, as has been shown collectively in Sections I-X.

Explanation of noncompliance with OMB and/or USDA Information Quality Guidelines.

OMB Guidelines: RM-217, as a whole, violates the objectivity and utility requirements of Public Law 106-554 § 515, and as specified in the OMB Guidelines. Information is presented in a biased manner. The substance of supporting information is biased, unclear and inaccurate.

Explanation of the Effect of the Alleged Error

RM-217, as a whole, places incorrect restrictions on forest and range management, recreation and other uses of public lands administered by the U.S. Forest Service. These restrictions errantly reduce timber harvests, timber quality, forage utilization, recreational opportunities and forest access while lengthening rotation ages and increasing maximum diameters and ages. The restrictions severely limit the availability and application of silvicultural tools that improve forest health, timber size and quality, forage production, and reduce the risks of catastrophic stand-replacing fires. The effect of the errors is to harm local and regional economies and communities, including the natural resources sector as a whole, and to subsequently harm the requestors.

In addition, RM-217, as a whole, promotes the creation of forest conditions that may negatively impact goshawk populations, as evidenced by the biased forest conditions required and recommended by the GSC. The effect is to harm the requestors' enjoyment of National Forest lands and its amenities. Should goshawk populations indeed decline as a consequence of negative impacts instigated by RM-217 requirements and recommendations, anticipated and likely additional forest management restrictions will further harm the requestors.

Scope and Influence of RM-217

As shown in the list of publications on the introductory pages of this petition, RM-217 has grown in influence and scope since publication in 1992. Multiple publications explicitly cite, access and are dependent on the quality of RM-217. RM-217 has been incorporated into the Forest Plans of all National Forests in Region 3. ("Record of Decision for Amendment of Forest Plans - Arizona and New Mexico." United States Department of Agriculture, Forest Service, Southwestern Region, dated June 5, 1996). During the research stage for this petition, a literature search produced documents citing RM-217 from as far away as Canada, and for a northern goshawk assessment in the Western Great Lakes.

The original scope of RM-217 included USFS Region 3 (Arizona and New Mexico). Since publication, the influence of RM-217 has expanded to include the western United States and Alaska. RM-217 has become influential, as defined in the OMB Guidelines in V.9, in that RM-217 "does have a clear and substantial impact on important public policies or important private sector decisions." Therefore, RM-217 must meet the highest information quality standards.

XII. Technical Reviews

On RM-217 p. 33, 19 technical reviewers are listed. A FOIA request was submitted to the USDA Forest Service, Rocky Mountain Experiment Station, Fort Collins, Colorado, to obtain copies of the reviews. The transmittal letter that accompanied the reviews specified that six reviews could not be found. A total of 13 signed reviews and one unsigned review were provided by the Forest Service. Of these 14 reviews, 10 were either relatively brief or formatted to respond to specific statements, referred to by page number or other reference, and generally focused on relatively minor issues with little accompanying discussion. Several of these reviews did include substantive comments that are reviewed in this section. In addition, four reviews include in-depth discussion particularly relevant to this petition - full text of these reviews is attached in Appendix 7.

OMB Guidelines (attached in Appendix 6) explicitly state that peer reviewed data and analytic results may "generally be presumed to be of acceptable objectivity":

V.3.b.i:

> If data and analytic results have been subjected to formal, independent, external peer review, the information may generally be presumed to be of acceptable objectivity. However, this presumption is rebuttable based on a persuasive showing by the petitioner in a particular instance. If agency-sponsored peer review is employed to help satisfy the objectivity standard, the review process employed shall meet the general criteria for competent and credible peer review recommended by OMB-OIRA to the President's Management Council (9/20/01) (http://www.whitehouse.gov/omb/inforeg/oira_review-process.html), namely, "that (a) peer reviewers be selected primarily on the basis of necessary technical expertise, (b) peer reviewers be expected to disclose to agencies prior technical/policy positions they may have taken on the issues at hand, (c) peer reviewers be expected to disclose to agencies their sources of personal and institutional funding (private or public sector), and (d) peer reviews be conducted in an open and vigorous manner."

As described above, OMB provides that the presumption of acceptable objectivity is rebuttable "in a particular instance." Reasoning for the rebuttable clause is included in the OMB Guidelines (see Appendix 6).

It is not the purpose of this petition to determine if peer review procedures used for RM-217 adhere to the "credible peer review" recommendations of the President's Management Council. Instead, the petitioners hold that a discussion of peer reviews strengthens the issues presented while meeting and exceeding any "persuasive showing" requirement. The petitioners further submit that each section of this petition (I-XII) is a "persuasive showing" that any presumption of acceptable objectivity is rebuttable. Further, the review and discussion of technical reviews in this section (XII), in conjunction with presented discussion and materials in the previous sections, shows that the technical review process used for RM-217 was inadequate for ensuring objectivity standards were met.

Technical reviews were reviewed for this petition after all other sections were completed. For this reason, none of the issues or concerns raised by technical reviewers are included in the petition as a result of their comments, and no discussion of or references to technical reviews are included in sections I-XI.

For this section, the objective was to evaluate the technical reviews to determine which issues were previously raised and available for consideration by the GSC. Because the reviewers were asked to review the draft manuscript, it would be expected that numerous suggestions were incorporated as changes in the final manuscript. Issues and recommendations presented by reviewers and not incorporated into RM-217, and that are the subject of this petition, are the topic of this section.

Section Format

Specific technical reviewer comments are presented here topically, in the order used for petition Sections I-XI, using corresponding subsections labeled i-xi. To limit redundancy, material presented here is highly contextual and is dependent on the reader's familiarity with Sections I-X. Reviewers references to passages in the draft manuscript, when used, are maintained in respective quotes.

i. Nest area size, quantity and stand structure

Nest area size determination is inaccurate and unclear

One reviewer explicitly asked for justification for the required nest stand size of 30 acres, as well as the reasoning behind the requirement for exactly three nest stands.

> In reading over the various prescriptions, I often found myself getting impatient or curious about where some of the specifics came from. For example, in section 7.1.2, p. 43 -what justifies the recommendation of 30 acres? If this is a case of simple "best professional judgment" then this should be stated. Alternatively, if the recommendation is data based, then ranges in estimated sizes of the nest areas should be provided. Are there circumstances where larger or smaller areas would be suitable? Also, on p. 43 in the previous section, a minimum of 3 nest areas / home range are called for. Why 3? What is the biology that justifies this recommendation?
>
> Without more of this kind of information, it was very difficult to evaluate the specific recommendations -even for the ponderosa pine forests that I am somewhat familiar with.
>
> Jeff Brawn
> Assistant Professional Scientist
> Illinois Natural History Museum

A biologist expressed confidence in the nest stand size of 20-25 acres by labeling the RM-217 reference as "evidence cited", but questioned the rationale of using the figure. Also see Appendix 3, section A3.13.1 of this petition.

> The evidence cited for nest stand size is 20-25 acres (page 21). Nest area could be variable depending on topography which determines configuration. If the nest is in a canyon with adjacent slopes of less dense vegetation then this could affect size. Setting a rigid size could conceivably put the boundary of the nest area in less desirable stand conditions.
>
> David R. Patton
> Northern Arizona University

Number of nest areas per nesting pair was arbitrarily inflated

See the passage by Jeff Brawn, above. Below, Mr. Brawn questioned the reasoning for suitable nest areas and identified the absence of supporting data as an important issue.

> On page 44, the term "potentially occupiable" is very troubling. Clearly, the data to determine if an area is otherwise suitable for goshawks is not available. In my

opinion, conclusions of habitat studies are often questionable in their generality because they are short term, based on a small sample of birds, and are area-specific. In reading Newton's recent work on E. Kestrels (sparrowhawks [?] -see 1990 J. Anim. Ecol.) it seems that the basic question of habitat occupancy is still not entirely clear. And this is for a well-studied cavity nester with easily manipulated breeding densities!

Jeff Brawn
Assistant Professional Scientist
Illinois Natural History Museum

Though in the final published version of RM-217 "potentially occupiable" seems to have been replaced with "suitable", the concerns of Ms. Morgan, below, remain pertinent - why 3, and why 6?

Terminology

What's the difference between potentially occupiable and replacement nests? Do you mean that each area should contain 6 potential nesting sites or 3 (p.43)? I read the definitions in the glossary and they were little help in differentiating replacement, potentially occupiable, and active nests. Why 3 of each (p.43)? Is an area the same as a site the same as a stand (e.g. p. 43 and glossary)? All three words are used throughout the text. I would interpret stands as being within either a site or an area, with site and area being synonymous. Simplify by using either site or area throughout the text.

Penelope Morgan
Associate Professor
College of Forestry, Wildlife and Range Sciences
University of Idaho, Moscow, ID

Another reviewer questioned the number of required nest areas. The need for clarity and supporting information was not met in RM-217.

11. Page 43

When does a nest become inactive; two, three or four years after no evidence of use (no chicks or eggs)? When inactive for a defined length of time can management activities occur in the area or does the nest become historical with guidelines for protection?

If I understand the terminology in the statement for providing 3 replacement nest areas per home range, there is 1 active nest area and 2 potential nest areas in a home range. In addition the proposal is to provide 3 replacement nest areas. I assume this is in case an active or potential nest area is destroyed. The language describing replacement and potential nest areas is not clear in the text or glossary. Is the replacement nest something less than a potential nest area which can be manipulated to provide the desired stand structure and tree density for the future? It seems to me that providing the number of replacement and potential nest areas suggested is a little too conservative if they can all be used in case of the destruction of an active nest area. The question is: how much of an insurance factor is needed to maintain an active nest area now and in the future?

David R. Patton
Northern Arizona University

Nest stand structure

A final note of serious concern. Reynolds has described to me a procedure for sampling conditions around the nest tree which is biased to the condition in the immediate vicinity of the nest tree and the prey plucking post. I am not familiar with other studies of nest sites, but information collected using the methodology of Reynolds cannot be reliably extrapolated to a 30-acre stand area. We have a systematic sample of 7 ponderosa pine nest sites and 1 pinyon-juniper nest site from the south Kaibab N.F. which demonstrate some interesting patterns across the delineated nest stand area. I realize that conditions on the south Kaibab are quite different from the north Kaibab and from other areas in the ponderosa pine and mixed species types. The fact that characteristics in these stands do not meet conditions in table 2, certainly demonstrates the need for further research, for the nest site, the PFAs, and the foraging areas. Our limited analysis demonstrates the need to consider both requirements for the group of trees containing the nest and patterns in the surrounding stand in the nest site.

Carleton B. Edminster
Project Leader
USDA Forest Service
Rocky Mountain Forest & Range
Experiment Station

ii. Post-fledging family areas

PFA existence is based on bias, speculation and arbitrary procedures

Mr. Patton again emphasized "the evidence", this time for PFA size, and then proceeded to politely question the 420 acre figure. In his comment 18, he questioned if a PFA is "defined as a territory", an issue discussed in Section II of this petition.

14. Page 46

The evidence indicates that PFAs are 300-600 acres (page 23). A size of 420 acres may be larger than needed if it is considered in relation to home range. A 300-acre area in a home range of 3000 acres may be fine for one pair while a 600-acre area in a home range of 6000 acres would be needed by another pair. The difference in sizes hypothetically is related to actual habitat quality differences between the two home ranges. Strict adherence to a 420-acre PFA does not seem to be the best solution.

18. It is not clear in the guidelines whether a PFA is defined as a territory and whether home ranges, but not territories, can overlap.

David R. Patton
Northern Arizona University

iii. Nest tree buffer size arbitrarily increased

The question posed below is an important issue discussed in Sections II and III of this petition.

> Does a post fledgling area by definition include the active nest area, potential nest areas, and replacement nest areas?
>
> David R. Patton
> Northern Arizona University

iv. Canopy cover

Specified canopy cover definition is biased

No reviewer was found to have discussed canopy cover measurement procedures in cited literature versus methods defined in RM-217.

Resulting canopy cover requirements and recommendations are biased

No reviewer was found to have discussed the bias introduced in RM-217 for defined canopy cover measurement procedures.

v. Goshawk prey species and desired foraging area conditions

Qualitative decision models are not transparent

One reviewer was found to have explicitly questioned the validity of the qualitative decision models - see Mr. Block's quotes in the next subsection below. Some disagreement was expressed with intricacies of assigned values for individual goshawk prey species. However, Rudy King identified the overall transparency issue in his overview: "Your committee chose an approach of literature analysis rather than direct study of the relevant goshawk population. There is nothing inherently wrong with this approach, but successful application requires a logical analysis framework, clearly supported assumptions and conclusions, and clearly described linkages among analysis steps and results." The reader is referred here to Mr. King's full review in Appendix 7 of this petition. As shown in this petition, Mr. King's advice was not honored in RM-217.

Two reviewers posed questions about the draft manuscript that touched lightly on transparency issues related to the qualitative decision models.

General Comments

2. What is the rationale for the order in which the prey species are addressed?

R. William Mannan
Associate Professor of Wildlife Ecology
University of Arizona

Below in his comment 19, Mr. Patton offered a five-page list of additional species in Arizona and New Mexico, indirectly suggesting that the GSCs list of 14 selected prey species was a candidate for revision.

19. The goshawk committee is now in a position to provide a list of priority research needs for the next 5 years. I hope this will be included as an appendix to the guidelines.

In addition to the above comments I am including a list of species that occur in the ponderosa pine and mixed conifer forests of Arizona and New Mexico. I believe this information will be useful in reviewing what additional prey species may be available to the goshawk.

David R. Patton
Northern Arizona University

Qualitative decision models are biased

Mr. Block, quoted more fully in Section XI discussion below, stated that his "...biggest concern, however, is that the committee has developed a somewhat precise model using very imprecise data." He suggested that nine implied assumptions should be explicitly addressed, including:

"5. Higher prey abundances will be found in VSSs 4, 5, and 6 (page 18)."

"9. Models of habitat use by prey species are accurate and provide a sound basis for management."

William R. Block
Research Wildlife Biologist
USDA Forest Service
Rocky Mountain Forest & Range
Experiment Station

In Section V of this petition, it is shown how the prey abundance conclusions are the result of qualitative model bias, and that the RM-217 models of habitat use, or decision models, are inaccurate, unsound and biased.

It is also shown in Section V that goshawk prey species were selected and weighted in a manner contradicting composition in goshawk diets, causing lower VSSs to be de-emphasized as higher VSSs were overemphasized. Mr. Menasco warned this would occur:

> Pg 34, 2nd Pg -There will be disagreement that rabbits and ground squirrels are at high pop. levels only in older age classes. There will also be disagreement with older age classes contain[ing] the most species at high population levels.
>
> Keith A. Menasco
> Forest Wildlife Staff
> USDA Forest Service
> Kaibab National Forest

Mr. Brawn warned that the prey species discussion, the basis for the qualitative decision models, was particularly problematic. Note that many of the problems with citations, reviewed in detail in Appendix 3 of this petition, are rooted in the prey species discussions.

> Life Histories of Prey Species -The appendix on prey species is not especially effective or informative and of limited usefulness. I base this judgement on the following points:
>
> 1) Sources of information about the basic life histories of the prey species are a real mishmash and of often questionable applicability. For example, the section on American Robin includes information from Colorado and Arizona, the Midwest, and Canada. Data from these sources are used interchangeably with virtually no attempt to synthesize or even speculate what the relevance of robin data from riparian habitat in Iowa is to the forest types considered in the document. Just about any life history trait can be affected by geographic variation, population structure (demographic and genetic), temporal variation, and sampling error (including different, often biased, estimation procedures). All these factors are likely to be in force here. In short, there are so many apple and orange comparisons that the summaries are of limited use.
>
> Jeff Brawn
> Assistant Professional Scientist
> Illinois Natural History Museum

Ms. Morgan also questioned why "old forest", or high VSSs, were being championed. The associated inherent bias toward reduced forest management activities, discussed in Section V and summarized in Section XI, answers Ms. Morgan's question.

> Table 7c, Appendix 4
> Why is old forest in the highest proportion under intensive management? Of course, intensive management can mean quite different structures depending on the products being managed for, but I find this very questionable. Since much of the rest of the text is based on these projections, I suggest they be checked in some detail. Intensive management can also lead to quite different structures depending on if it is based on uneven-aged or even-aged forests. One has only to look at the differences in stand structures between the forests on the Fort Apache Indian Reservation and the adjacent Apache-Sitgreaves National Forest to see how different management styles can leave quite different stand

structures. Parts of both areas have been intensively managed (I don't advocate one or the other as being better).

Penelope Morgan
Associate Professor
College of Forestry, Wildlife and Range Sciences
University of Idaho, Moscow, ID

Mr. King directly questioned the GSC conclusions favoring high VSSs over low VSSs:

Your decision to concentrate your analysis on prey populations seems well conceived, but flawed in execution since you never directly connect goshawk dietary requirements with associated prey population levels needed. Instead, you assume that optimal habitat is required for all prey species. This utopian ideal may be neither attainable nor required for healthy goshawk populations. You conclude (page 18) that VSS classes 4-6 should be emphasized in your recommendations without ever addressing whether adequate prey populations might exist if substantial portions of the landscape contained VSS classes 1-3. This conclusion is central to your recommendations and needs better arguments than you have presented.

Emphasis on VSS classes 4-6 is also not entirely consistent with the information presented, at least as I am able to piece the story together. Your presentation could reasonably be described as containing a sequence of landmarks with sometimes only vague footprints describing the routes taken in between. The presented life histories are not completely consistent, neither internally nor with summaries presented in Tables 4 and 5.

Rudy M. King
Station Biometrician
USDA Forest Service
Rocky Mountain Forest & Range Experiment Station

Mr. Johnson also strongly questioned the validity of the GSCs VSS conclusions:

App. 6, p. 6. As you can tell by my comments above, I do not feel that erring on the side of mid-aged to old forests is justified by the facts, not in the foraging areas. It seems to me plenty of prey would be provided in 5400 acres of VSS 1 to 5.

Marlin Johnson
USDA Forest Service, Southwestern Region

vi. Vegetation Structural Stage

VSS inadequately supported by documentation and lacks theoretical basis

The research silviculturist at the USDA FS Rocky Mountain Forest & Range Experiment Station rejected VSS:

> - Drop VSS, its inappropriate and confusing to readers. If I had to look it up other non-R3 folks will too."
>
> Wayne D. Shepperd
> Research Forester
> USDA Forest Service
> Rocky Mountain Forest & Range
> Experiment Station

The research mensurationist at the USDA FS Rocky Mountain Forest & Range Experiment Station rejected VSS:

> Another example is vegetation structural stage (VSS). VSS is defined as a method of describing the growth stages of a stand of living trees. Yet in many of the references to VSS, the term "forest" is used. In addition, VSS is supposedly based on tree size and total canopy cover. Yet, the descriptions for the stages are based on age. Now size and age are confounded, and the descriptions relate only to even-aged "forests!" More on this later.
>
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>
> Now on to some more specific comments. As mentioned earlier, VSS is "defined" at the stand level, used at the forest level, and involves two confounded tree characteristics, size and age. Arghh! In addition, it has the inherent weakness as either a stand or forest concept of being applicable only to even-aged stands. I recommend dropping the concept as inherently flawed. I view VSS as an attempt to get away from some former descriptions, especially for ponderosa pine in the Southwest, which were related to timber volumes and values. I have no problem with the reasoning for dropping these old classifications from a timber sales standpoint, given that management had been headed in the direction of emphasizing relatively young forest products. However, now we are faced with attempting to return to a forest condition where older trees are an integral component of the landscape and the old classifications that describe these tree conditions provide a good communication base with other disciplines and the public for ponderosa pine. The old classifications are based on tree characteristics and can be applied at the tree, group of trees, stand, and forest levels. I prefer to only apply them at the tree and groups of trees level, given the variability in forest vegetation pattern in the Southwest. In addition, the classes have parallels to the other forest types. I agree with keeping 6 classes. In VSS the classes are 1. grass/forb/shrub (0-1 inch diameter), 2. seedling/sapling (1-5 inches), 3. young forest (5-12 inches), 4. mid-aged forest (12-18 inches), 5. mature forest (18-24 inches), 6. old forest (24+ inches). Throw out the size classes; they are confounded with age (the more useful qualitative descriptors), site quality, and stand density.
>
> Carleton B. Edminster
> Project Leader
> USDA Forest Service
> Rocky Mountain Forest & Range
> Experiment Station

Ms. Morgan was confused by VSS:

SPECIFIC COMMENTS

p. 15 VSS
There is no specification of presence or abundance of snags within a VSS. Did you omit this be accident or do you feel that you have taken care of this in the structural recommendations for nesting areas, PFA's and FA's? Many old growth definitions require snags present, so I wondered why there were not descriptors of snags in VSS-6.

What does the DBH range for each VSS represent? Is it based on all trees greater than 4.5 ft tall or codominants and dominants only? Do you mean this literally as a range (e.g. within a stand that the DBH of individual trees may range from 24 -35 inches) or as a range in mean diameters among stands. If you mean the latter, do you want arithmetic mean of diameters or quadratic mean of diameters, all or only codominant and dominant trees, or what?). One could interpret the range as the difference in diameter between the smallest and largest trees within the stand, which means that two quite different stands could qualify as the same VSS, 1 with 1 large tree and the rest very small and another with all large trees except for 1 small sapling. Please clarify the desired distribution -- mean and standard deviation might work.

See related general comment. How these averages are applied across large areas is a problem throughout the text.

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Table 2
The codes you have used (VSS-5a, etc) are very unclear. I couldn't decide whether the one in the first column was a typographical error, another kind of error, or okay. Please include an example of how this would be used in the glossary if you do use it. This is the only place in the text that I saw these codes used --perhaps you could use descriptors with the VSS numbers instead of the letter codes. At least include the descriptors in the footnotes.

Penelope Morgan
Associate Professor
College of Forestry, Wildlife and Range Sciences
University of Idaho, Moscow, ID

Mr. Menasco questioned VSS 6:

Pg 15, Appendix 6, VSS - It is stated in the table that stage 6 is 24+. I would recommend the committee use 18"+, same as stage 5.

Keith A. Menasco
Forest Wildlife Staff
USDA Forest Service
Kaibab National Forest

Mr. Patton politely reminded the authors of the confounding relationship between age and tree size:

4. Page 15

References to age should be to size because of the differences in site index.

David R. Patton
Northern Arizona University

vii. Extrapolation from targeted populations

Failure to identify and abide by target populations for goshawk nest stands and nest areas

Mr. Brawn highlighted the sampling bias issue in general terms (bold emphasis added):

1) Sources of information about the basic life histories of the prey species are a real mishmash and of often questionable applicability. For example, the section on American Robin includes information from Colorado and Arizona, the Midwest, and Canada. Data from these sources are used interchangeably with virtually no attempt to synthesize or even speculate what the relevance of robin data from riparian habitat in Iowa is to the forest types considered in the document. **Just about any life history trait can be affected by geographic variation, population structure (demographic and genetic), temporal variation, and sampling error (including different, often biased, estimation procedures). All these factors are likely to be in force here.** In short, there are so many apple and orange comparisons that the summaries are of limited use.

Jeff Brawn
Assistant Professional Scientist
Illinois Natural History Museum

Below, Mr. Edminster explicitly identified the site index break issue and sampling bias problems, and then cautioned against extrapolating nest site data to 30-acre stands. Note that the systematic sample of nest sites on the south Kaibab is the same dataset graphed in Fig. 11 of this petition, where the ponderosa pine nest stands are represented by red rings: the GSC had been warned explicitly, prior to publication, that the minimum nest stand requirements were a problem and were seriously contradicted by this nest stand data.

From a practical standpoint, a forester is doing well to estimate site index to the nearest 10-foot class. Yet the table makes a very definite break for "high" and "low" site indexes for ponderosa pine and mixed species. Does the level of knowledge support these precise breaks?

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A final note of serious concern. Reynolds has described to me a procedure for sampling conditions around the nest tree which is biased to the condition in the immediate vicinity of the nest tree and the prey plucking post. I am not familiar

with other studies of nest sites, but information collected using the methodology of Reynolds cannot be reliably extrapolated to a 30-acre stand area. We have a systematic sample of 7 ponderosa pine nest sites and 1 pinyon-juniper nest site from the south Kaibab N.F. which demonstrate some interesting patterns across the delineated nest stand area. I realize that conditions on the south Kaibab are quite different from the north Kaibab and from other areas in the ponderosa pine and mixed species types. The fact that characteristics in these stands do not meet conditions in table 2, certainly demonstrates the need for further research, for the nest site, the PFAs, and the foraging areas. Our limited analysis demonstrates the need to consider both requirements for the group of trees containing the nest and patterns in the surrounding stand in the nest site. Results of this admittedly small sample certainly casts doubt on the extrapolation of results from other areas and regions without validation for use in the Southwest.

Carleton B. Edminster
Project Leader
USDA Forest Service
Rocky Mountain Forest & Range
Experiment Station

The Unsigned Reviewer asked directly if minimum nest stand attributes were accurate, citing explicit figures. The discrepancy described in the last two sentences below is readily viewed in Fig. 11 of this petition - the ponderosa pine nest stand minimum requirements are bounded by TPA=30, DBH=22", and BA=140.

Is Table 2 Minimum structural attributes for stockable areas within nest sites accurate. From my reading a basal area of 80-100 is appropriate for the nest site. Why does it go to 120, 140, 110, 130 for ponderosa pine and Mixed species. There were many areas in the reading material suggesting for VSS of 5 and 6 the basal area be 80-100. Also if Table 2 is correct why do the figures (basal area) not agree with trees per acre and DBH. For example Ponderosa Pine 30 TPA at 22" DBH is 80 Basal Area not 140.

Unsigned Review

Ms. Morgan asked for sources for the site index breaks:

Are the references on p. 22 and 23 the sources for the minimum acceptable structural attributes on high and low productivity sites? If not, where did they come from and if so, please indicate that fact more clearly in Table 2 and on p. 23.

Penelope Morgan
Associate Professor
College of Forestry, Wildlife and Range
Sciences
University of Idaho, Moscow, ID

Mr. Shepperd asked the GSC to ensure stated, quantified conditions be achievable, important advice considering Mr. Edminster's , Ms. Morgan's and the Unsigned Reviewer's comments above.

"I would offer the following suggestions to the Committee in revising these guidelines:

- Emphasize the forest conditions needed, not the details of how to achieve them. Describe in detail the age, size, and appearance of forests in the landscape, including horizontal and vertical structure as well as population aggregation. Specific statements quantifying types of trees, snags, forage, and openings are ok, just make sure they are clearly defined, make biologic sense, and are achievable."

Wayne D. Shepperd
Research Forester
USDA Forest Service
Rocky Mountain Forest & Range
Experiment Station

Failure to identify and abide by target populations for goshawk foraging areas

Aside from the general bias issues above, no reviewer identified or discussed the specific issues discussed in this subsection of the petition for foraging areas.

viii. Grazing/forage utilization restrictions

Mr. Johnson questioned forage utilization limits.

Even though the younger (VSS 1, 2, and 3) areas were thinned to levels that would provide high levels of browse, I doubt they would provide enough for current levels of elk in much of the Region. This is further complicated by your direction to only graze/browse 20% average and 40% maximum of the available forage. While you do not propose a lowering of elk numbers, it seems evident that would be necessary to accomplish your goshawk objectives.

Marlin Johnson
USDA Forest Service,
Southwestern Region

ix. Road densities

No reviewer was found to have asked for supporting references for the road minimization mandate.

Mr. Johnson asks below about the meaningful difference between permanent skid roads versus roads, and this was an opportunity for the GSC to expound on the positive correlation between goshawk nest sites and proximity to roads.

What is gained by using permanent skid roads instead of roads? If the roads or skid roads are closed after use anyway, will there be any different impacts? Skid roads disturb more ground and may be less desireable from other aspects, too.

Marlin Johnson
USDA Forest Service,
Southwestern Region

Mr. Menasco asked for a road density ranges - an additional opportunity to discuss empirical studies for road minimization requirements:

Pg 62, C - What is a desired level, i.e., 2 miles per square mile, 1 mile per square mile, what? I recommend the committee make its best estimate at a range, otherwise this recommendation will be interpreted totally different from Forest to Forest.

Keith A. Menasco
Forest Wildlife Staff
USDA Forest Service
Kaibab National Forest

x. RM-217 citations

No reviewer was found to have expressly stated that citations were reviewed in detail. Several reviewers explicitly stated they did not review citations or verified few.

> Literature cited
> I did not check many, but some cited in the text were missing from the list in the back. Also, some were missing details like page numbers. I indicated problems when I saw them, but they should be checked.
>
> Penelope Morgan
> Associate Professor
> College of Forestry, Wildlife and Range Sciences
> University of Idaho, Moscow, ID

Mr. Brawn comments below that "In short, the document demands a certain amount of 'faith'." This issue is directly relevant to introductory discussion in Section X of this petition, and Appendix 3 discussion of primary, secondary and tertiary citations.

> I did not check out the references cited (other than by title and only one [Crocker Bedford] was readily accessible), and found myself wondering about the empirical foundation of the management document. Are goshawks declining throughout the southwest in all forest types considered in the document? Are there good data supporting the idea that the declines are over and above what would be expected by random chance alone? Are there analyses of trends in land-use that portend increasing problems for goshawks? In short, the document demands a certain amount of "faith." I am personally comfortable with this, but strongly suggest that the justification be strengthened in this document and elsewhere.
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> Life Histories of Prey Species -The appendix on prey species is not especially effective or informative and of limited usefulness. I base this judgement on the following points:
>
> 4) In many cases, the literature does not appear to be well covered. The paper I've included might help for some of the birds in Arizona because it is an extension of Szaro and Balda. Overall, there is too much reliance on unreviewed documents (e.g., theses, dissertations, and in-house reports) or literature reviews. The section on Steller's Jay contains contradictory information about habitat associations (p. 74-75) with no explanation. In other sections, as on p. 77, many rather specific statements are unreferenced.
>
> Jeff Brawn
> Assistant Professional Scientist
> Illinois Natural History Museum

Mr. Block expressed concern over substandard citations:

I gave the "Management Recommendations for the Northern Goshawk in the Southwestern United States" a relatively quick reading.

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Second, the document relies far to [sic] much on 'ms. in prep.', or on 'pers. obs.' and 'pers. comm'. These are unacceptable sources of information for use in most scientific publication. I suggest that the authors locate support for their assertions from the established literature.

William R. Block
Research Wildlife Biologist
USDA Forest Service
Rocky Mountain Forest & Range
Experiment Station

In RM-217, at least 32 citations are substandard and "are unacceptable sources of information for use in scientific publication", including 14 personal observations, 6 personal communications, 10 unpublished data, 1 "personal communication in a cited reference", and 1 manuscript in preparation.

(The difficulty incurred when attempting to secure theses and dissertations for consideration in development of this petition is not considered to be a significant issue because the documents cannot be expected to meet peer review standards. Difficult access further reinforces the illegitimacy of using theses and dissertations as supporting references in scientific publications.)

Mr. Patton politely suggested a remedy for one type of inadequate citation:

3. Page 13
References to material in preparation (Kennedy and Reynolds) cannot be checked by readers unless you make a draft copy available. I suggest that this type of reference material be retained in a file in the regional office. Interested persons will want access to the supporting facts when the final guidelines are released to the public.

David R. Patton
Northern Arizona University

Mr. States noted that "in some cases" primary references were not used where utilization would have been appropriate.

Literature cited was used sparingly and in some cases some primary references were not given where they could have been appropriately included.

Jack States
Professor of Biology
Northern Arizona University

Importantly, for the draft manuscript, Mr. Brawn found himself "wondering about the empirical foundation of the management document" and stated that "In many cases, the literature does not appear to be well covered..."; Mr. Block suggested "that the authors locate support for their assertions from the established literature"; and, Mr. States noted that "literature cited was used sparingly".

In RM-217, the criticism of the reviewers went unheeded, and many substandard citations were retained. Additionally, the abundance of citations in RM-217, when considered in the context of the previous paragraph, suggests that the GSC responded to reviewer criticism by using a "shotgun" approach to locating references and inserting citations. The multiple errors in citations discussed in Section X and Appendix 3 of this petition further supports this proposition.

xi. Inherent bias reveals lack of objectivity for whole publication

In Section XI of this petition, the errors described in Sections I-X are concisely reviewed in the full context of RM-217. Indeed, "The Management Recommendations for the Northern Goshawk in the Southwestern United States" is but a single model, one of many possible, proposed for application on federal lands managed by the U.S. Forest Service.

Numerous reviewers expressed concern and advanced warnings that the GSC modeling approach, unless substantially revised, would lead to indefensible conclusions and errant recommendations.

> I have read your manuscript about as thoroughly as a non-specialist can and have developed serious concerns about the basis presented for your committee's recommendations. Your committee chose an approach of literature analysis rather than direct study of the relevant goshawk population. There is nothing inherently wrong with this approach, but successful application requires a logical analysis framework, clearly supported assumptions and conclusions, and clearly described linkages among analysis steps and results.
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> . . .
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> And, the final management recommendations are presented with only limited linkages back to your prey population arguments and otherwise seem of fairly arbitrary structure. Are your management recommendations feasible and sustainable? I suggest that you need to directly address these questions in some detail.
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> . . .
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> My judgment is that you have not presented adequate support for your conclusions, and I hope that my concerns and questions are clear and understandable. I do not believe that you have presented adequate building blocks for your recommendations, especially from a silvicultural perspective, and the lack of clear linkages between conclusions and building blocks presented makes the foundation for your recommendations unstable. I would appreciate seeing the previous reviews of the manuscript, to ascertain whether I alone am

concerned about these issues. Please advise if you wish to further discuss or require my assistance to address the necessary issues.

Rudy M. King
Station Biometrician
USDA Forest Service
Rocky Mountain Forest & Range
Experiment Station

In general, I found the model presented by the committee to represent a plausible alternative for goshawk management. Perhaps my biggest concern, however, is that the committee has developed a somewhat precise model using very imprecise data. By imprecise data, I refer to the fact that little empirical data are used as a basis for natural history information on the goshawk or for its prey. Most information is gleaned from the literature, and whether or not it applies to goshawks and prey species in the southwest is unknown.

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As noted above, I view the guidelines as a conceptual model. Any model is based on a set of underlying assumptions. The assumptions should be stated a priori and quite clearly. In turn, these assumptions should be tested to determine their validity and effects of assumption violations on the model accuracy.

William R. Block
Research Wildlife Biologist
USDA Forest Service
Rocky Mountain Forest & Range
Experiment Station

The premise of this management document is based on the idea that habitat and population performance of the northern goshawk can be accurately evaluated through use/availability data for both the hawk and its prey species. However, I must advise caution against total reliance on this as an indicator without also considering a mechanism to link population performance to the environmental characteristics of the habitat that influence species distribution and abundance. (See Hobbs & Hanley 1990, J. Wldlf. Man. 54:515).

Jack States
Professor of Biology
Northern Arizona University

I am very concerned that without proper supporting information, the recommendations in this draft may not result in desired outcomes. At the very least the recommendations are too specific, narrow in scope, and very possibly unattainable or at least unsustainable.

Carleton B. Edminster
Project Leader
USDA Forest Service
Rocky Mountain Forest & Range
Experiment Station

Averages

What variation is acceptable about the average values you recommend for density of snags, reserve trees, interspersion, diameters within a given VSS, etc.? When these numbers are averaged over the entire FA, for instance, very different forest structures (and values for goshawk habitat) could be described by the same averages. This is a problem throughout the text, e.g. p. 42, throughout section on silvicultural recommendations, and in description of VSS.

Penelope Morgan
Associate Professor
College of Forestry, Wildlife and Range Sciences
University of Idaho, Moscow, ID

Page 25-- I recognize that you are trying to review all available information but I question the relevance of some of the information from eastern woodlands. Perhaps you could let the reader know how this information was used, or how it influences management in southwestern forests.

R. William Mannan
Associate Professor of Wildlife Ecology
University of Arizona

I am also concerned that the specific actions proposed by the Committee will not sustain the landscape conditions they intended.

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Finally, I am bothered by the strong single resource orientation of these recommendations. I realize that this document was chartered in response to specific concerns about goshawk habitat in the southwest, but I also know that goshawks aren't the only resource managed in these forests. If goshawks are indeed a species whose vitality is indicative of overall ecosystem vigor, then a stronger identification of the multi-resource benefits of these proposed actions is needed in this document. Otherwise, the charge can be made that goshawk habitat will replace timber production as the paramount resource managed in southwestern forests.

Wayne D. Shepperd
Research Forester
USDA Forest Service
Rocky Mountain Forest & Range Experiment Station

Several other authors expressed general agreement with the conceptual approach and the recommendations offered in the draft.

However, their attention to and discussion of scientific vigor and quality was generally not provided.

It is clear from the described errors in Section I-X, and discussion in Section XII, that the concerns expressed above by reviewers for the draft manuscript also apply to RM-217. The RM-217 errors are in part the result of failures to heed the advice of reviewers that would have elevated the importance of and adherence to a vigorous scientific process.

XIII. Recommendation and Justification for How the Information Should be Corrected

The extent and magnitude of the demonstrated errors in RM-217 exceed any conceivable effort that could be made to merely correct errors. Requestors therefore recommend full withdrawal (retraction) of RM-217.

The influence of RM-217 is significant. Many organizations, government agencies, the federal judiciary, private companies and private citizens have relied, and continue to rely, on the high quality that was incorrectly implied to be associated with its contents. To correct the harm already caused, and to prevent further harm, the requestors recommend the following steps be taken to ensure the intended and unintended audience, past, current and future, be notified of the withdrawal (retraction):

1. Immediately cease distribution of RM-217 and destroy undistributed copies.

2. Publish a Notice of Withdrawal in the Federal Register.

3. Provide written notification to all USDA Forest Service employees.

4. Provide written notification to the U.S. Fish and Wildlife Service, additionally requesting internal notification of all USFWS employees.

5. Provide written notification to the U.S. EPA.

6. Provide written notification to all State natural resource/forestry/wildlife agencies.

7. Provide written notice to editors of forestry, natural resource, and wildlife journals.

8. Provide written notice to forest industry trade organizations, Cattlemen's/Agricultural organizations, and wildlife interest organizations.

9. Provide written notice to all research libraries known or believed to possess RM-217 in their collections, requesting the publication be withdrawn from public access and destroyed, or through other methods, request the publication be marked plainly and clearly to notify readers of the withdrawal.

10. Provide written notification of all persons and entities known to have received a copy of RM-217 from USDA Forest Service offices and publication distribution centers.

11. Distribute press releases notifying the media of the withdrawal.

12. Post notification in an appropriate database of information corrected and/or withdrawn, and available for public access on the Internet.

13. Provide written notice to the federal congressional delegation of the western states.

14. Ensure, if published on the Internet by any public agency, that RM-217 is removed through notification of hosting entities.

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Appendix 3. RM-217 statements with supporting citations

Reviews of selected RM-217 statements with supporting citations are listed below. Statements are numbered for reference purposes. For example:

A3.10.1

(*Petition Appendix Number*).(*RM-217 page number*).(*statement number*)

In the example above:

- "A3" refers to Appendix 3 of this petition
- "10" is the RM-217 page number of the subject statement
- "1" indicates the statement is the first statement on the RM-217 page reviewed in this appendix. If more than one statement on a page is reviewed, this field is numbered sequentially for each statement.

In this appendix, citations used in RM-217 statements and reviewed here are highlighted in bold type. In discussion, bold type indicates the reference was not included in RM-217 and is instead listed in Appendix 2 of this petition as an independent supporting reference.

Primary, secondary and tertiary citations

Statements utilizing citations are expected to be supported by the literature to which the reader is referred. When a cited reference directly supports the RM-217 statement, the citation in RM-217 is referred to here as a primary citation. When the citation in RM-217 (first document) refers to a citation in a second document that merely cites a third document that must be consulted for original and supporting information, the citation in RM-217 (first document) to the second document is not a directly supporting citation, and the original RM-217 citation is referred to here as a secondary citation. If a fourth document is ultimately the original source material, the original citation may be referred to as a tertiary citation.

Secondary and tertiary citations do not meet FDQA requirements because the subject statement is neither reliable nor clear; the reader must then either pursue, unexpectedly, multiple documents to verify the original statement, or place unwarranted faith in the interpretation of a series of independent and unrelated authors that the original source of information does indeed support the top-level citing statement. Further, when secondary and tertiary citations are not individually flagged by the author using them, the discovery of their use renders all citations to be inferior and substandard, and the good faith requested of the reader by the author in his ability to reliably convey supporting information, is, indeed, lost.

Section Summaries

A brief summary for each section is offered in Section X.

Classification of errors by category

The statements reviewed in this appendix are a subset of problematic statements in RM-217 that were discovered during development of Sections I-XI of this petition. At the end of each section, citation errors are classified by five categories. The error categories are compiled in Section X, Table 10.

Petition Sections

At the end of each section in this appendix, petition sections (I-XI) that refer to the subject RM-217 statement are listed and noted with a checkmark.

A3.10.1 - Goshawk population decline statement contradicted by supporting reference

RM-217, p. 10:

> "It has been suggested that population declines are associated with tree harvests, but other factors (toxic chemicals, drought, lack of fire, disease, and tree harvest on prey species) could be involved, perhaps synergistically (Snyder et al. 1973, Reynolds 1989, Smith et al. 1991)."

Review objective: Check "other factors" in citations.

Notes:

Snyder et al. (1973), p. 304:

> "Levels of DDE in the goshawk eggs analyzed have been relatively low, and we know of no cases of egg breakage in this species. Apparently protected by its generally low position in food chains, this species is not known to be suffering a general population decline in any region."

The Snyder citation directly refutes the RM-217 statement concerning toxic chemicals.

Reynolds 1989: secondary citations only. No original research to support any of the "other factors".

Smith et al. 1991: draft final report, by Dames and Moore Professional Limited Partnership. Not available without the permission of Kaibab Forest Products, which no longer operates in the forest products sector. Not reviewed.

Conclusion:

RM-217 statement is, at best, inadequately supported by citations.

Information quality issues:

☐ One or more cited references not materially related to statement
☐ Cited reference is misrepresented
☑ Statement directly contradicted by one or more references
☐ Substantive errors
☑ Secondary citations

Petition section(s) referring to the subject statement:

☐ I	☐ VII
☐ II	☐ VIII
☐ III	☐ IX
☐ IV	☐ X
☐ V	☑ XII
☐ VI	

A3.13.1 - Nest site size not supported

RM-217, p. 13:

> "The size (20-25 acres) and shape of nest areas depend on topography and the availability of patches of dense, large trees (Reynolds 1983)."

Review objective: Verify "20-25 acres".

Notes:

Reynolds (1983), p. 3:

> (1) "Accipiter 'nest sites' are defined as the forest stand containing the nest tree, including both the structural features of the vegetation (e.g., tree density, canopy closure) and the land form (e.g., slope, aspect) within an area used by a pair and their fledglings during the nesting season (Reynolds et al. 1982). Thus, the boundaries of nest sites were determined by observations of the movements of the adults and fledged young as well as the locations of prey plucking areas and roosts. Nest sites in Oregon measured in this way ranged from approximately 4 ha for sharp-shinned hawks to 6 ha for Cooper's hawks, and from 8 ha to 10 ha for goshawks."

Reynolds (1983) is a summary of three previous studies, and the above quote describes results cited from and attributed to Reynolds et al. (1982). Therefore, the RM-217 citation of Reynolds (1983) is a secondary citation, and Reynolds (1983) is not a primary reference that supports the RM-217 statement. Further, there is no mention in Reynolds (1983) that the "availability of patches of dense, large trees" determines the size and shape of nest areas.

Referring to Reynolds et al. (1982), p. 124, the objectives described in the 1982 paper

> (2) "...were to (1) describe the vegetation and topography of the nesting habitats in 2 geographic regions of Oregon; (2) examine differences in the vegetative structure of the habitats used by nesting by sharp-shinned hawks, Cooper's hawks, and goshawks in both regions; and (3) examine how the characteristics of the vegetation of the nesting habitat might be related to the physiological and behavioral adaptations associated with Accipiter nesting ecology."

Methods used are described in Reynolds et al. (1982), p. 126:

> (3) "A nest site is defined as the area surrounding the nest tree, including the vegetation and topographic features, used by a nesting pair during an entire nesting season, exclusive of foraging areas. Vegetational and physiographic characteristics of nest sites were obtained on 2 levels of examination. Level I involved recording the slope, aspect, presence or absence of water, height of the nest, and a brief description of the vegetation of all nest sites. Level II involved an intensive characterization of the vegetative structure of nest sites... Level II

characterization was completed in late summer after the young hawks left the nest."

The authors never declared nest site boundaries had actually been measured, and the methods section describes only vegetation measurements. Methods used to determine nest site boundaries, and hence area and corresponding physical bounds on the placement of sample points, were not described, and no related area data was reported. The results section concentrates on a presentation of physical characteristics from Level I and vegetation data from Level II (n=7 for goshawks). The only mention of nest site area is in "Management Implications", Reynolds et al. (1982) p. 137:

(4) "On the basis of the area used by the nesting adults, and later, the fledged young, we suggest that forest stands of 4, 6 and 8 ha be left intact around sharp-shinned, Cooper's, and goshawk nests, respectively."

For goshawks, 8 ha equals 19.8 acres.

Repeating from the Reynolds (1983) passage (1) above:

(5) "Thus, the boundaries of nest sites were determined by observations of the movements of the adults and fledged young as well as the locations of prey plucking areas and roosts."

In passage (3), Reynolds et al. (1982), the source to which passage (1) and thus passage (5) are attributed, made no mention of the inclusion of prey plucking areas and roosts as defining parameters for nest site boundaries. However, on p. 134 of Reynolds et al. (1982), a single mean was given for goshawk prey-plucking distances to nest trees, even though no corroborating data other than range was provided:

(6) The principal prey-plucking areas in goshawk nest sites evaluated at level II averaged 45 m (range 27-74 m) from the nest trees, and slopes of the sighting line from the principal plucking areas to the nests averaged +13% (range, +5 to +35%).

Noting here that a radius of 45 m corresponds to a circular nest area of 0.64 ha (1.6 ac), no data was provided or supporting statements were made in Reynolds et al. (1982) to justify the 8 ha (19.8 ac) nest size provided on their p. 137.

Referring to passage (5), no distances from nest trees to roosts were provided or discussed in Reynolds et al. (1982); referring to passages (4) and (5), no distances were reported or discussed in Reynolds et al. (1982) for the movements of adults and fledged young relative to nest trees. Referring to passage (3), no distances were reported or discussed in Reynolds et al. (1982) for vegetation and topographic features relative to nest trees.

The reader is left with the mere and unsubstantiated *suggestion* in Reynolds et al. (1982) that a goshawk nest site area might well be 8 ha (19.8 ac) in size (passage 4). In passage (1), Reynolds (1983)

attributed an expanded nest area of 8 ha to 10 ha (19.8 ac to 24.7 ac) to Reynolds et al. (1982).

Tracing the progression, there is no substantiating data providing for a goshawk nest site area of 8 ha in Reynolds et al. (1982). However, one might surmise with caution that perhaps a nest area is 0.64 ha (1.6 ac) in size, as discussed above for passage (6).

Thus, without corroborating data, nest sites increased in size from 1.6 acres as a reader may *perceive* in the body of Reynolds et al. (1982), to 19.8 acres at the *suggestion* of Reynolds et al. (1982) in closing comments, to 19.8-24.7 acres in Reynolds (1983) but attributed to Reynolds et al. (1982), to 20-25 acres on RM-217 p. 13 and attributed to Reynolds (1983), and finally to 30 acres in RM-217, without citation, substantiation or corroboration. See Section I of this petition.

Conclusion:

The RM-217 statement uses a secondary citation wherein the primary reference (Reynolds et al. 1982) includes only a statement of speculation and conjecture (nest stand size of 19.8 acres) made in the absence of supporting and reported data for goshawk nest site size. The RM-217 nest site size requirement of 20-25 acres, stated on p. 13, is not supported by the citation provided. Reynolds (1983) does not support "the availability of patches of dense, large trees".

Information quality issues:

☐ One or more cited references not materially related to statement
☑ Cited reference is misrepresented
☐ Statement directly contradicted by one or more references
☐ Substantive errors
☑ Secondary citations

Petition section(s) referring to the subject statement:

☑ I	☐ VII
☐ II	☐ VIII
☐ III	☐ IX
☐ IV	☐ X
☐ V	☑ XI
☐ VI	

A3.13.2 - Nest stand attributes not supported

RM-217, p. 13:

> "Goshawk nest stands have a relatively high tree canopy cover and a high density of large trees (Bartelt 1974, McGowan 1975, Hennessy 1978, Shuster 1980, Reynolds et al. 1982, Saunders 1982, Moore and Henny 1983, Hall 1984, Speiser and Bosakowski 1987, Crocker-Bedford and Chaney 1988, Kennedy 1988, Hayward and Escano 1989) (Table 5)."

Review objective: Verify "high tree canopy cover" and "high density of large trees".

Notes:

Here, discussion is limited to canopy cover. Detailed discussion of the "high density of large trees" phrase is provided in Section VII in regard to incorrect extrapolation from targeted populations in cited literature.

Bartelt (1974): thesis - Interlibrary loan request not successful, not reviewed

McGowan (1975): Alaska Dept. of Fish and Game - no response to inquiry, not reviewed

Hennessy (1978): thesis - Interlibrary loan request not successful, not reviewed

Shuster (1980): did not measure or discuss canopy cover

Reynolds et al. (1982):

Canopy cover measurement methods in Reynolds et al. (1982) were described as follows (p. 126):

> "Canopy cover was determined by estimating the percentage of sky obstructed by vegetation directly over each point."

Though nest stands were defined (p. 126), no data or methods were presented to describe the physical demarcation of nest stand boundaries, and the measured sizes of targeted nest stands were not provided. The method used for sample point installation is described on p. 126 as:

> "The point-centered-quarter technique (Cottam et al. 1953) was used for vegetation sampling. Six sampling points at each nest site were established; 4 randomly, and 1 each at the major prey-plucking area and at the nest tree."

For each nest stand, then, 2 of 6 points were purposefully located at sites with specific attributes, and the 4 randomly located points were located within nest stands of unknown area and at unknown distances from plucking and nest tree points. Thus, the sample was biased toward nest tree microsite conditions, as measured by the point-centered quarter method, a distance-based nearest-neighbor sampling technique limited to a maximum of 4 trees per point (see **Cottam et al. 1953**).

Reynolds et al. (1982) provides a biased estimator of canopy cover for nest stands of indeterminate size, and it is not a valid supporting citation for the RM-217 phrase, "Goshawk nest stands have a relatively high tree canopy cover...".

Saunders (1982): thesis - Interlibrary loan request not successful, not reviewed

Moore and Henny (1983): canopy cover measured with a spherical densiometer. Their target population consisted of "nest areas", measured by centering 0.2-ac plots at the nest tree. Stand conditions were not sampled. Canopy cover was measured as follows (Moore and Henny 1983, p. 66):

> "The following nest characteristics were measured: height, exposure, nest substrate and canopy coverage at the nest (measured with a spherical densiometer)."

On p. 72, Moore and Henry refer to canopy cover as "nest canopy coverage". Though not entirely clear, it appears that Moore and Henry measured canopy cover from on top of each nest.

Because it appears Moore and Henry did not measure canopy cover from near the ground, and because they used small plots centered on nest trees and did not attempt to measure stand conditions, Moore and Henry (1983) does not support the RM-217 statement, "Goshawk nest stands have a relatively high tree canopy cover and a high density of large trees." To do otherwise would require extrapolation from targeted microsite conditions to large stands as defined by the GSC.

Hall (1984): thesis - Interlibrary loan request not successful, not reviewed

Speiser and Bosakowski (1987): did not measure canopy cover.

Crocker-Bedford and Chaney (1988): measured canopy cover with a spherical densiometer on 2.96 ac plots (nest sites) centered on nest trees. Nine points were located and measured within the 2.96 ac plots. Spherical densiometer measurements were made at the variable radius points. (See Crocker-Bedford and Chaney (1988), p. 211.)

Crocker-Bedford and Chaney (1988) used a multi-step extrapolation process to expand densiometer measurements from 2.96 ac plots to 8-10 ha timber (nest) stands. First, ocular estimates were made for canopy cover on the nest stands using 10-year-old aerial photos (only four of 36 nest stand estimates were made from recent aerial

photos). Second, aerial photo estimates of canopy cover were made for the 2.96 ac nest sites. Next, a simple adjustment was used to "convert" aerial photo canopy cover estimates to spherical densiometer estimates.

The selection of 8-10 ha nest stands was attributed to Reynolds et al. 1982 and Reynolds 1983 (Crocker-Bedford and Chaney 1988, p. 211). It is shown in A13.13.1 (above) that the 8-10 ha nest size was presented as an expression of opinion in the absence of supporting data.

Spherical densiometers measure a wide field of view, similar to a wide-angle camera lens, and relative canopy cover measures will be higher than vertical projection methods and related techniques (see Section IV of this petition). Interpretation of canopy cover from aerial photos is somewhat similar to vertical projection methods, but the camera lens distorts the viewing angle depending on the location of trees and stands relative to the center of the lens and the angle of the camera, and side views of tree crowns will be common. This issue was acknowledged by Crocker-Bedford and Chaney on p. 215: "Spherical densiometer measurements and aerial photo estimates are higher than directly vertical measurements, because the former two include angled measurements of the sides of some trees." This statement de-emphasizes the bias. Stands located toward the center of the aerial photo will be closest to a vertical view. Entire stands, not just "some trees", are represented by an increasingly angled view as distance from the photo center increases.

Because of the high altitude of the camera, smaller trees, branches and space between branches and between trees will be difficult or impossible to see that are easily distinguished from the ground when using a densiometer or other instrument. Regarding the use of aerial photos, **Avery and Burkhart (Forest Measurements, 1994, Fourth Edition)** describe canopy cover (crown-closure) measurement as follows (p. 70):

> "At photo scales of 1:15,000 and smaller, crown-closure estimates are usually made by ocular judgement, and stands are grouped into 10 percent classes. Ocular estimates are easiest in stands of low density, but they become progressively more difficult as closure percentages increase. Minor stand openings are difficult to see on small-scale photographs, and they are often shrouded by tree shadows. *These factors can lead to overestimates of crown closure, particularly in dense stands.* And if ocular estimates are erratic, the variable of crown closure may contribute very little to the prediction of stand volume.
>
> "With high-resolution photographs at scales of 1:5000 to 1:15,000, it may be feasible to derive crown-closure estimates with the aid of finely subdivided dot grids. Here, the proportion of the total number of dots that falls on tree crowns provides the estimate of crown closure. *This estimation technique has the virtue of producing a reasonable degree of consistency among various photo interpreters; it is therefore recommended wherever applicable.*" [Emphasis added.]

(The same paragraphs are included in the second edition, published in 1975, on p. 102, and therefore this information was accessible to

the authors in a readily-available textbook. Crocker-Bedford and Chaney offered no citations or references that might be considered in support of the validity of their extrapolation techniques.)

The method used by Crocker-Bedford and Chaney to estimate canopy cover from aerial photos is described on their p. 211:

> "At each of the nine sampling points in each of the 43 nest sites, two canopy cover measurements were made using a spherical densiometer (Lehmkuhl 1981). Average canopy cover for each nest site was also estimated with a USFS crown cover gauge and aerial photos. Canopy coverage of each nest site was estimated from aerial photos independently of densiometer measurements to compare the two methods.
>
> "Canopy coverage of each 8- to 10-ha nesting stand and each control stand was also estimated from aerial photos. Photos taken in 1972 at the 1:15,840 scale were used to estimate canopy coverage whenever possible. For the four nesting stands that had been harvested between 1972 and 1980, we used 1:24,000 photos taken in 1981."

The crown cover gauge is likely a printed guide showing black-and-white mottling to represent percentage classes of canopy cover.

Crocker-Bedford and Chaney, therefore, chose to use ocular estimates of canopy cover in dense stands from low-resolution aerial photos - the exact combination described by **Avery and Burkhart (1994)** as the least reliable method that is also subject to measurement bias and high sampling variability. Further, Crocker-Bedford and Chaney mixed photo resolutions and years, introducing still more variance-inflating factors.

As discussed above, aerial photo estimates of canopy cover may inadvertently be biased toward higher relative values compared to true values and ground measurements. Crocker-Bedford and Chaney, on p. 212, reported:

> "For the 43 nest sites, densiometer measurements averaged 3% more than canopy coverage estimates from aerial photos (paired t = P < 0.01)."

While this may be an interesting exercise, it does not address issues of bias likely incurred during aerial photo interpretation that could result in inordinately high canopy cover values. Thus, the validity of using aerial photo interpretation as a proxy for direct densiometer measures of canopy cover must be questioned, and extrapolation of densiometer values from 2.96 ac nest sites to 20-25 acre nest stands relies on readily refuted assumptions.

The existence of bias is not detectable through means testing, and the absence of bias is a strict and required underlying assumption of statistical inference. In warning about the hazards and implications of bias, **Snedecor and Cochran (1976)** describe the bias issue as follows on pp. 109-110:

> "With either independent or paired samples, the analysis assumes that the difference ($\overline{X}_1 - \overline{X}_2$) is an unbiased estimate of the population mean difference between the two treatments. Unless precautions are taken when conducting an experiment, ($\overline{X}_1 - \overline{X}_2$) may be subject to a bias of unknown amount that makes the conclusion false."

The likely bias in aerial photo canopy cover measurement methods used by Crocker-Bedford and Chaney introduces an untenable situation where their conclusions are likely to be false. First, bias is introduced into the ocular aerial photo estimate of canopy cover on the 2.96-ac nest site, which are presumably accurately located on aerial photos for each nest tree. Second, bias is introduced into the ocular aerial photo estimate of canopy cover on the 8-10 ha nest stands. Third, bias is introduced into the ocular aerial photo estimate of canopy cover on the 360 control stands (Crocker-Bedford and Chaney (1988), pp. 211 and 212). The direction and magnitude of the bias is unknown. Variability among and within interpreters, and accompanying methodology bias, further confound any effort to duplicate and corroborate their results.

The 3% difference in mean values for densiometer vs. aerial photo estimates of canopy cover, when compared to the expected large difference between densiometer values and vertical projection measurements (see Section IV of this petition), strongly suggests the bias does indeed exist in their data.

Because the GSC defined canopy cover as a strict vertical projection method, and Crocker-Bedford and Chaney instead used a spherical densiometer on small plots then extrapolated with ocular estimates using aerial photos and biased methods to estimate nest stand (20-25 acres) canopy cover, the RM-217 statement, "Goshawk nest stands have a relatively high tree canopy cover..." is not supported by Crocker-Bedford and Chaney (1988), and their results are not compatible with nest stand minimum requirements in RM-217, p. 14, Table 5.

Kennedy (1988): did not measure canopy cover.

Hayward and Escano (1989): on p. 476, the authors reported using 0.1 ac fixed-area plots centered on nest trees. They did not measure plots across nest stands beyond the nest site plots. Their findings and conclusions must not be extrapolated beyond the 0.1 ac nest sites. On p. 478, they warned:

> "The design of the survey was not intended to test for habitat selection."

Thus, Hayward and Escano may not be used to support the RM-217 statement, "Goshawk nest stands have a relatively high tree canopy cover and a high density of large trees."

Conclusion:

Available and reviewed references do not support the RM-217 statement regarding canopy cover. The citation of Crocker-Bedford

and Chaney (1988) introduces error (bias) into RM-217 canopy cover requirements and recommendations. Other references either do not discuss canopy cover, or, extrapolation beyond the nest site plots violates limits of targeted populations in original research (Hayward and Escano (1989), Reynolds et al. (1982), Moore and Henney (1983)). In RM-217, none of these issues were presented or discussed.

Hayward and Escano (1989) warned their results were not valid for determination of habitat selection. In RM-217, their work was cited in support of nest stand characteristics to differentiate nesting habitat from non-nesting habitat, in violation of the warning. Hence, the RM-217 contradicts the cited reference and misrepresents the work of Hayward and Escano.

Information quality issues:

☐ One or more cited references not materially related to statement
☑ Cited reference is misrepresented
☑ Statement directly contradicted by one or more references
☑ Substantive errors
☐ Secondary citations

Petition section(s) referring to the subject statement:

☐ I	☐ VII
☐ II	☐ VIII
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A3.13.3 - Nest stand/area requirements not supported

RM-217, p. 13:

> "Information on tree height, diameter, and canopy closure of goshawk nest areas in interior ponderosa pine and mixed-species forests is provided by Reynolds et al. (1982), Moore and Henny (1983), Crocker-Bedford and Chaney (1988), Kennedy (1988), and Patla (1990)."

Review objective: Verify "diameter" and "canopy closure" sources.

Notes:

Concerning "tree height, diameter, and canopy closure of goshawk nest areas", the RM-217 statement was made in the context of nest stand requirements specified in RM-217 Table 5, p. 14.

Reynolds et al. (1982): as discussed in A13.13.1 (above), Reynolds et al. 1982 provided insufficient detail to determine if their results could indeed be applied to 20-25 acre nest stands. Further, because the study originated in Oregon where forests are commonly higher in stocking than in the southwest, and trees also exhibit faster growth rates and larger diameters, it is not relevant to directly apply findings from the northwestern U.S. to forests in the southwest. This regional differentiation was noted by Hayward and Escano (1989), a RM-217 reference. When contrasting their work in Montana and Idaho, on p. 478, they reported:

> "Basal area of coniferous nest sites in Colorado did not differ significantly ($P > 0.05$) from those in our region (Shuster 1980), but in California (Hall, unpubl.) and northeastern Oregon (Moore 1980) significantly ($P < 0.05$) greater basal areas were recorded."

In addition, Kennedy (1998) (p. 225), cited frequently in RM-217, offered the opinion: "For example, the data collected on accipiters in the Pacific Northwest cannot be used to accurately portray nest site habitat in the Southwest."

The method used by Reynolds et al. (1982) for canopy cover measurement was described on p. 126:

> "Canopy cover was determined by estimating the percentage of sky obstructed by vegetation directly over each point."

Without further procedural information, it is not possible to know exactly how this was done. Because no instrument was mentioned, it is likely this was an ocular estimate. Therefore, the canopy cover results in Reynolds et al. (1982) are incompatible with the vertical projection method mandated by the GSC in RM-217.

Thus, Reynolds et al. (1982) is an invalid citation when referenced as supporting documentation for minimum nest stand requirements in RM-217.

Moore and Henny (1983): to apply their results in RM-217, their data must be extrapolated from targeted microsite conditions to large stands as defined by the GSC. See Table 9, this petition, and related discussion in Section VII (Improper extrapolation from targeted populations).

Thus, Moore and Henny (1983) is an invalid citation when referenced as supporting documentation for minimum nest stand requirements in RM-217.

Crocker-Bedford and Chaney (1988): Because of the extrapolation methods used for canopy cover estimation across 8-10 ha (20-25 ac) nest stands, Crocker-Bedford and Chaney (1988) is an invalid supporting citation for RM-217 nest stand canopy cover requirements. Further, because their canopy cover measurement methods differ completely from the vertical crown project method required by the GSC in RM-217, the canopy cover findings are not compatible with RM-217 and the included definition of canopy cover using vertical projection measures. See A3.13.2 for a review and discussion of sampling methods and extrapolation techniques used for their canopy cover work.

Regarding "tree height" and "diameter" parameters in the RM-217 statement, Crocker-Bedford and Chaney sampled 1.2 ha (2.97 ac) nest sites encompassing nest trees. These nest sites were sampled with 9 variable-radius points in each "buffer". No explanation is offered for point location methods. At 21 of the 43 nest sites, they identified tally trees using a 20-BAF prism on a variable-radius point located at the nest tree, and measured heights of trees on the point (Crocker-Bedford and Chaney (1988), p. 211). This suggests a sample grid may have been used within nest sites, and one of the nest site points may have been located at the nest tree, in which case the sample is strongly biased toward nest tree characteristics. But, this is entirely unclear. None-the-less, their forest structure description as derived from the sample points applies only to 2.97-ac nest sites, and must not be extrapolated to 30-acre nest stands.

Thus, Crocker-Bedford and Chaney (1988) is an invalid citation when referenced as supporting documentation for minimum nest stand requirements in RM-217.

Kennedy (1988): on p. 219, Kennedy 1998 defined the target population as follows:

> "Accipiter nest sites are defined as the forest site containing the nest tree, including both the structural features of the vegetation, (e.g., tree density), and the landform (e.g., slope, aspect) within an area used by a pair and their fledglings during the nesting seasons (Reynolds et al. 1982). Thus, the boundaries of the nest site for habitat evaluation were determined by observations of the movements of adults and fledged young near the nest as well as the locations of prey plucking areas and roosts."

No data was reported by Kennedy for nest stand sizes as determined using this definition. Therefore, the actual size of sampled nest stands is indeterminate and unspecified. In 'Management Recommendations', Kennedy (1988) p. 225, the following statement was offered:

> "The recommendations are based on the results of this study and published USFS recommendations (Reynolds 1983).
>
> " - Search all proposed timber sales for accipiter nests during the nestling stage (during May for northern goshawks and June for Cooper's hawks). Potential nest sites cannot currently be predicted based on vegetation data so nest searches are necessary.
>
> " - Uncut areas of approximately 10 ha and 20 ha should be left around active nests of Cooper's hawks and northern goshawks, respectively. These areas should include portions of the site upslope from the nest containing the plucking and roost sites. The entire nest site, not just the nest tree, should be preserved."

The "uncut area" recommendation of 10 ha to 20 ha was offered by Kennedy as conjecture and opinion, without the benefit of supporting data. There is no explanation offered for Kennedy's increased nest stand size to 10-20 ha (25-49 acres) and the clear deviation from the "published USFS recommendations (Reynolds 1983)" of 20-25 acres. In the Kennedy-cited reference to Reynolds (1983), it is clear that nest stand size is a secondary citation to Reynolds et al. (1982), and this primary latter reference offered only conjecture and opinion that the nest stand size should be 8-10 ha, again without the benefit of supporting data. See A13.13.1, above.

Therefore, the validity of Kennedy's targeted nest stands and delineation is questionable.

On p. 219 of Kennedy (1988), the author's nest site sampling method is described. (Note that Kennedy used "nest site" to describe the "nest stand" as defined elsewhere, whereas other authors commonly refer to the "nest site" as a small area around the nest tree generally encompassed by relatively small fixed-area plots. RM-217 does not include "nest site" in the glossary.)

> "The vegetative parameters were measured at 9-10 points within each nest site. The distribution of the points was centered at the nest tree. One point included the nest tree and the remaining points were separated by a minimum of 200 m (this varied depending upon the size of the nest site). The points were randomly located along transects established along the four cardinal directions from the nest tree."

Thus, one point was fixed at the nest tree, and the remaining 8-9 points were distributed at least 200 m apart along the cardinal axes, which in the case of a circular nest site, is at least 50.2 ha (124.2 acres) in size. This method is biased toward nest tree conditions in two ways. First, one of the 9 or 10 points was

purposefully located to sample the conditions at the nest tree. Second, the stand area represented by sample points increases exponentially as distance from the nest tree increases. This may be envisioned as a set of overlaid concentric circles, centered on the nest tree, where the total area of a concentric band is represented by points located within them. The center circle, relatively small in area, is represented by the sample point at the nest tree. Points established along the cardinal axes represent increasing stand area as distance from the nest tree increases.

Therefore, mean values and diameter distributions (see Kennedy 1988 p. 223-224) are biased because (1) one point in every nest stand was intentionally installed to sample point conditions at the nest tree, and (2) points furthest from the nest tree represent more stand area, while the nest tree point represents the least, and mean stand characteristics are weighted (biased) toward the localized nest tree condition.

Should goshawks be selecting specific and localized conditions that differ from the remainder of the nest stand, the result of the bias in the Kennedy sample design would be to overemphasize conditions at the nest tree relative to the entire stand, while de-emphasizing conditions across the greatest proportion of nest stand area.

The study presented in Kennedy (1988) did not involve the measurement of canopy cover.

Therefore, because Kennedy (1998) did not involve the measurement of canopy cover, and because the chosen sampling method is biased to overrepresent conditions at and near the nest tree, Kennedy 1998 is an invalid citation that does not support the RM-217 statement on p. 13, nor does it support the minimum nest stand requirements of RM-217, Table 5, p. 14.

Patla (1990): measured 0.31-ac plots centered on nest trees, and results must not be extrapolated to nest stands or areas. Additionally, canopy cover measurements were made through ocular estimation, a method that is not compatible with the vertical projection method required in RM-217.

Conclusion:

The RM-217 minimum required parameters for "tree height, diameter, and canopy closure of goshawk nest areas" are not supported by any of the cited references.

Information quality issues:

☐ One or more cited references not materially related to statement
☐ Cited reference is misrepresented
☐ Statement directly contradicted by one or more references
☑ Substantive errors
☐ Secondary citations

Petition section(s) referring to the subject statement:

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A3.13.4 - Existence of PFA not supported

RM-217, p. 13:

> "In a radio-telemetry study of the post-fledging behavior of goshawks, Kennedy (1989, 1990) described an area used by the adults and young from the time the young leave the nest until they are no longer dependent on the adults for food. This 'post-fledging family area (PFA)' surrounds the nest area..."

Review objective: Verify Kennedy (1989, 1990) for PFA description.

Notes:

Two Kennedy citations are listed in RM-217 to support the existence of post-fledging areas:

Kennedy (1990) is an abstract of a symposium presentation listed on p. 259 of the 259-page proceedings. No manuscript/paper is included in the symposium proceedings. An inquiry to the proceedings editor requesting information regarding "peer review" status, and the reason for the missing paper, resulted in the explanation that only an abstract had been submitted (personal communication, Paul R. Krausman). Kennedy (1990) is a sub-standard reference that should not have been used in RM-217.

Kennedy (1989): an unpublished final report from the Santa Fe National Forest.

In the abstract, the female core area is referred to as follows (Kennedy 1990, p. 269):

> "Female northern goshawk range sizes (n=5) were significantly smaller than male range sizes (n=3) ($P < 0.05$)."
>
> "The females' 95% utilization contours and core areas averaged 569.3 and 167.9 ha, respectively. The core areas represent concentrated use areas and include: preferred hunting areas near the nest, perches, roost sites, and training areas for the fledglings."
>
> "The females' core areas include the major plucking posts, perches, and the areas used by the fledglings during the fledgling dependency period. These areas should be protected from habitat disturbance. Around each active northern goshawk nest a 200 ha buffer zone should be identified that included the nest, favorite perches, and plucking posts. The shape of this buffer zone is dictated by the topography."

Thus, the female core area (n=5) averaged 167.9 ha (415 ac), but Kennedy expanded it to 200 ha (494 ac), based apparently on conjecture and opinion, since no supporting data was provided for the increase.

In RM-217, p.13-14, the GSC further defined PFAs:

> "PFAs vary in size from 300 to 600 acres (mean = 415 acres) and may correspond to the territory (a defended area) of a pair of goshawks (Kennedy 1989)."

There is no indication in Kennedy 1989 that this core area was determined to be "a defended area", and it is not clear where "300 to 600 acres", or 121 to 243 hectares, was derived from in either reference. It is important to note that though Kennedy 1989 chose to expand the protected core area to 200 hectares (494 acres), the GSC chose 167.9 hectares (415 acres).

The small sample size and symposium abstract status of the cited reference, including the failure to submit a full paper for peer review pursuant to symposium requirements, nullify the validity of the Kennedy (1990) citation.

Conclusion:

Kennedy (1990) is a substandard reference that, therefore, is materially not related to the citing statement.

Kennedy (1989) did not identify a female core area (or PFA) based on fledgling dependency, and did not state, posit or show a correspondence to a territory or defended area.

Further details of the Kennedy (1989) unpublished paper are discussed in Section II (Post-fledging areas) of this petition. The purported existence of PFAs is not supported by cited references.

Information quality issues:

☑ One or more cited references not materially related to statement
☑ Cited reference is misrepresented
☐ Statement directly contradicted by one or more references
☐ Substantive errors
☐ Secondary citations

Petition section(s) referring to the subject statement:

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A3.15.1 - VSS concept not supported

RM-217, p. 15:

> "An integrative approach, combining vegetation and forest growth, has been developed for the Southwest (after Thomas et al. 1979) and is a generalized description of forest age and tree size from seedling to old forests."

Review objective:

Verify VSS source.

Notes:

Thomas et al. (1979): "Snags", Thomas et al. (1979), is a general treatment of snag utilization, with a discussion of methods for calculating snag retention parameters. The citation reported by the GSC in RM-217 as the inspiration for VSS is limited to three uncited explanatory sentences touching on the interaction of snags, wildlife and snag succession, beginning (p. 65):

> "The successional stage of the surrounding plant community also influences the way wildlife use snags (fig. 39)."

Figure 39, titled "The wildlife species that use snags are influenced by the stage of forest succession in which a snag occurs", is a diagrammatic representation of a single snag in each of six stages of even-aged forest succession. There is no discussion, investigation, or inherent research exploring the development, validity or applicability of a six-stage forest succession model for southwestern forests or any other forests.

Goshawk Prey Species

The VSS citation is discussed below in conjunction with goshawk prey species discussion in Section V, passages (3) - (18).

The sentence immediately following the above quote is (Thomas et al. 1979, p. 65):

> "Bluebirds and house wrens will use cavities in a sang that occurs in the grass-forb stage or shrub-seedling stage and will not ordinarily use the same sang if it is surrounded by more advanced successional stages."

The adjacency of the two Thomas quotes, with the discussion of open-forest snag conditions, emphasizes the unexplained exclusion of bluebirds from the list of selected goshawk prey species. See Section V (Selection of goshawk prey species and desired forest conditions).

Conclusion:

The use of Thomas et al. (1979) as a supporting reference alleged to serve as the theoretical basis for VSS is a substandard citation. One sentence and a diagram are wholly inadequate for use in a citation purported to refer to an authoritative work implied to serve as the substantive body of information used to develop an entire forest development model for the five forest types of the southwestern United States. Thomas et al. (1979) does not materially support the citing statement, and it is misrepresented as being substantive and authoritative.

In combination with the goshawk diet table in RM-217 Appendix 2, Thomas et al. (1979) offered strongly suggestive information that bluebirds should be considered as an important goshawk prey species, along with the open stand conditions associated with meadows and stands of low stocking, including clearcuts. This information was ignored, and it directly contradicts the RM-217 determination of important goshawk prey species and subsequent desired forest conditions.

Information quality issues:

☑ One or more cited references not materially related to statement
☑ Cited reference is misrepresented
☑ Statement directly contradicted by one or more references
☐ Substantive errors
☐ Secondary citations

Petition section(s) referring to the subject statement:

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☑ VI	

A3.18.1 - Fungi canopy cover value not supported

RM-217, p. 18:

> "Fungi are best produced in conifer stands with canopy cover greater than 60%. In ponderosa pine forests the best fungi-producing stands are mid-aged with high canopy cover (States 1985, States et al. 1988, Uphoff 1990)."

Review objective:

Verify canopy cover value and statement.

Notes:

States 1985: specific canopy cover measurement methods were not described. Canopy cover was estimated for a small number of discrete classes. It is likely this was an ocular estimate because no methodology explanation was offered. The target population for the study is described on States (1985), p. 271:

> "Monthly sporocarp production was measured in two stands, each with a mixture of two age-vigor classes, mature-yellow pine and young-blackjack pine."

States (1985) provides no indication that young even-aged stands (seedlings, saplings, small and large poles), uneven-aged multi-storied stands with more than two age classes, or strict even-aged stands were sampled. Instead, he contrasted "young-blackjack pine" with "mature-yellow pine" as sampled in two two-storied stands. No further data or clarification was offered to describe forest conditions. His finding for fungi production is limited to the following sentence (p. 271):

> "Sporocarp distribution was found to be non-random and clustered beneath the more dense canopy of Young-blackjack pine stands than the mature-yellow pine."

No further data or clarifications accompany this statement. His one-page paper concentrates on reporting general results and sporocarp distributions for random, "high canopy" and "low canopy" points.

His canopy classes are described as:

> "Canopy estimate scale: 1 = no cover; 2 = low; 3 = moderate; 4 = high; 5 = total."

For his Table 3, he reported number of stems, mean canopy estimate and number of sporocarps for three "sample type" classes: random sample points, selected points for high canopy, and selected points for low canopy. It is not explained how he selected "high canopy" and "low canopy" points for analysis. For number of sporocarps, it is not directly specified if the given value is a total or mean value, though the table title suggests the values are totals.

No methodology was offered for measurement of canopy cover, and because he states that "The greatest production of fruit-bodies was found to be positively and significantly correlated with *estimates* of canopy cover" [emphasis added], ocular estimation may be assumed, but with uncertainty. Because he offered only a canopy cover scale, it may be assumed ocular canopy cover estimates were made for four discrete classes, but with additional uncertainty. The meaning of class 5 is unclear.

Given the uncertainties, it is not clear how the data was analyzed, but he reported (presumably linear) regression results for "selected points for high canopy" as a footnote to his Table 3:

> "Correlation coefficient for sporocarp versus canopy estimate = 0.952, regression p = .0127."

Normally an author will report a coefficient of determination (r^2) with regression results, though a correlation coefficient (r) may also be of interest. Assuming then that r=0.952, r^2=0.906 and approximately 90% of variability in the sampled sporocarp population was explained by ocular four-class estimates of canopy cover. This is a rather meaningful and strong relationship for natural resource data of any type, though the high r^2 suggests that a canopy cover instrument may have been used.

The regression analysis applies to "selected points for high canopy". Thus, States (1985) determined there was a high correlation between the number of sporocarps and canopy cover for *points with high canopy cover,* a subset of total canopy cover estimates from the canopy cover sample distribution.

States (1985) reported the regression results apply only to sites of high canopy cover, and therefore results cannot be used to support differences in fungi production among "young-blackjack pine" and "mature-yellow pine" forest conditions or among age-differentiated stands. It is unreasonable and incorrect to conclude from States (1985), as on RM-217 p.18, that "Fungi are best produced in conifer stands with canopy cover greater than 60%. In ponderosa pine forests the best fungi-producing stands are mid-aged with high canopy cover."

Further, States (1985) pointed out on p. 271 that the "best" (RM-217 term) or "especially productive" (States term) stands were found to be related to aspect and mineral soil water retention:

> "Some stands of Ponderosa pine were found to be especially productive up to 22 kg/ha/yr. They occupied north facing slopes where water retention in the mineral soil was measurably greater."

States (1985) did not discuss any confounding relationship between aspect, levels of canopy cover and soil water retention.

Thus, though it may be concluded from States (1985) that he reported a positive correlation between canopy cover and the number of sporocarps, and that he associated high canopy cover with "young-

blackjack" in his sample, any additional clarification is not justified.

The RM-217, p. 18 passage, if accepted, would be expected to support the statement on RM-217 p. 19:

> "Goshawk foraging habitat will have sustainable and abundant prey when the majority of forests are in older age classes."

In RM-217 it is stated on p. 21 that:

> "5) creating large openings in forests results in the reduction of the abundance of fruiting fungi, and lower populations of prey that feed on fungi (States 1985, Pederson et al. 1987)."

States (1985) never discussed openings (nor the implied clearcuts), nor lower populations of prey, and it is incorrect and fully misleading to declare States (1985) is a supporting and authoritative work to support the statement. Importantly, Pederson et al. (1987) did not measure canopy cover, a matter to be revisited below.

The 60% minimum canopy cover mandate for fungi production in ponderosa pine forests, which cannot be attributed to either States (1985) or States et al. (1988) (see below), is maintained at 60% for one-third of "mid-aged portions", but the value is relaxed to 50% canopy cover for two-thirds of "mid-aged portions" and 50% canopy cover for "mature and old VSSs" on RM-217 p. 23:

> "**Stand structure:** The portions of the PFA in the mature and old VSSs have a minimum canopy cover of 50%. One-third of the area in the mid-aged portion has a minimum canopy cover of 60%, and the remaining two-thirds has a minimum canopy cover of 50%. This distribution provides hiding cover for fledgling goshawks and moist forest soils for development of fungi."

This was done without explanation or supporting citations. Similar statements are made for PFAs in Mixed-species and Spruce-fir forest types on RM-217, p. 24.

On RM-217 p. 74, for Tassel-Eared Squirrel discussion, the relationship between canopy cover and fungi is again disclosed:

> "The occurrence of fungi in the habitat of this squirrel is correlated with canopy cover and summer rains (States 1985, Pederson et al. 1987)."

As disclosed above, Pederson et al. (1987) did not measure canopy cover, and therefore canopy cover requirements for fungi production and specified in RM-217 must be derived from States (1985). The GSC reiterates this citation dependence on RM-217 p. 75, again for Tassel-Eared Squirrels:

> "Mature trees often produce the most cones (Larson and Schubert 1970), and abundant truffle foods are often associated with young pine stands with canopy cover greater than 65% (States 1985)."

Having discovered minimum canopy cover requirements of 60%, 50% and 65% for fungi production, all of which can only be based, incorrectly, on States (1985) or no reference at all, the reader may wonder what the minimum canopy cover requirement is in foraging areas, particularly in regard to fungi production.

On RM-217, p. 27, the answer is provided:

> "**Stand structure:** The portions of the foraging area in the mature and old VSS should have a minimum canopy cover of 40%. This level helps provide moist forest soils for the development of fungi."

This, too, was provided without explanation or supporting citations. Similar statements are made for foraging areas in Mixed-species and Spruce-fir forests on RM-217 p. 28.

The RM-217 statement, "Fungi are best produced in conifer stands with canopy cover greater than 60%", an explicit quantitative finding, is simply not supported by the States (1985) attribution. The same is true for declared minimum canopy cover values of 50%, 65%, and 40%.

States et al. 1988: this paper describes a study as follows (States et al. (1988), p. 425):

> "The purpose of this study was to determine the seasonal patterns of food resource utilization by Abert squirrels in selected ponderosa pine stands and to relate the results to squirrel population levels within the stands."

This is not an original work for either canopy cover or fungi production in different stand conditions. Canopy cover was not measured as part of the reported study. Two statements in States et al. (1988) (p. 429) cite States (1985) for comments on truffle production relative to blackjack pine and high canopy cover.

The RM-217 use of States et al. (1988) is a secondary citation referring to the previously cited States (1985). States et al. (1988) is not a valid reference for support of the RM-217 statement.

Uphoff 1990: thesis - Interlibrary loan request not successful, not reviewed

Conclusion:

For the opening RM-217 statement in this section, it is incorrect to place a minimum canopy cover value of 60% in the first sentence and attribute it to States (1985), and it is invalid to cite States et al. (1988) as an original authoritative reference supporting the RM-217 statement on crown cover - the secondary citation is inappropriate and incorrect. The liberal extrapolation of States (1985) study conclusions to include all "ponderosa pine forests" is incorrect when, in fact, States (1985) targeted one two-storied condition in two stands or plots.

Related minimum canopy cover requirements in RM-217 for fungi production (40%, 50%, 60% and 65%) are inconsistent, published without adequate reference or discussion, and where supported with citations, point to States (1985), where no explicit canopy cover values, minimum or otherwise, are published.

The cited and reviewed references are not materially related to the citing statements because explicit canopy cover requirements, the subject of multiple statements, did not originate in the references. The references are misrepresented, because the reader is led to believe that the stated canopy cover values were published in the cited references. The citation of a thesis, difficult to obtain and not peer reviewed, is the last remaining but substandard reference available to support the RM-217 statement.

The RM-217 statements are therefore contradicted by cited references. The creation of explicit canopy cover requirements which are then presented as being directly credited to other authors is a substantial error. The secondary citations should not have been used.

Information quality issues:

☑ One or more cited references not materially related to statement
☑ Cited reference is misrepresented
☑ Statement directly contradicted by one or more references
☑ Substantive errors
☑ Secondary citations

Petition section(s) referring to the subject statement:

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A3.20.1 - Citations do not support western fire regime

RM-217, p. 20:

> "Before the arrival of European settlers, ponderosa pine forests throughout western North America were burned every 2-15 years by low-intensity, lightning-caused, non-catastrophic surface fires (Cooper 1960, 1961, Avery et al. 1976, Gruell et al. 1982, Dieterich 1980, 1983, McCune 1983, White 1985, Swetnam 1988, Covington and Moore 1991)."

Review objective: Check fire frequency statement. Check sources for "...burned every 2-15 years".

Notes:

Cooper (1960): not located

Cooper (1961): investigated spatial patterns of contemporary ponderosa pine stands. There is no indication he used dendrochronology to estimate fire frequencies.

Avery et al. (1976): in "Fifty-year records of virgin stand development in southwestern ponderosa pine", Avery, Larson and Schubert presented raw data produced from 50 years of remeasurement work. There is no indication they used dendrochronology methods to estimate fire frequencies.

Gruell et al. (1982): presented a historic photo record for a forest in western Montana. Gruell et al. made no statements about 2-15 year fire frequencies, and made only a generic statement about "frequent light ground fires".

Dieterich (1980): Valid citation - not exactly a 2-15 year fire regime, but adequately close to support the RM-217 statement.

Dieterich (1983): Valid citation.

McCune (1983): presented and discussed original dendrochronology results based on pooled data for various forest types for "low-elevation mesic forests in the 12 major Bitterroot Canyons..." of Montana (McCune 1983, p. 212). He concluded, on p. 215: "Thus, the fire cycle before this suppression was probably between 55 and 70 years." McCune (1983), therefore, does not support the RM-217 statement that "ponderosa pine forests throughout western North America were burned every 2-15 years".

White (1985): on p. 592-593, White refers to 2.2 year and 4.2 year fire regimes, supporting his statements with citations to Dieterich (1980) (discussed above). This is a secondary citation.

Swetnam (1988): fire frequency work adequately supports the 2-15 year interval in RM-217.

Covington and Moore 1991: not located.

Conclusion:

Of the 10 cited references in the RM-217 statement, 2 were not located for review.

Of the remaining 8, only three are valid statements that support the RM-217 statement, *including* the 2-15 year fire interval that is central to the meaning of the sentence.

One reference, an original study of fire frequencies, reported a return interval of 55 to 70 years and therefore fails to support the RM-217 statement.

One reference is a secondary citation that should not have been included.

Three references are wholly unrelated to the citing statement.

Information quality issues:

☑ One or more cited references not materially related to statement
☑ Cited reference is misrepresented
☑ Statement directly contradicted by one or more references
☐ Substantive errors
☑ Secondary citations

Petition section(s) referring to the subject statement:

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☐ VI	

A3.22.1 - Forage utilization requirements incorrectly attributed and without basis

RM-217, p. 22:

> "Wildlife and livestock utilization of grasses and forbs should average 20% by weight and not exceed 40% in any area, and shrub utilization should average 40% by weight and not exceed 60% in any area. These levels of utilization should maintain native food and cover for many of the prey species (Schmutz 1978, Wasser 1982)."

Review objective: Verify sources.

Notes:

Schmutz (1978): Title - "Estimating range use with grazed-class photo guides." A photo guide for determination of forage utilization, with an introductory discussion. From Schmutz (1978), p. 4:

> "Most grasses can stand 40 to 50% use on a total weight basis but many shrubs can stand 60 to 70% use or more of the current year's twig growth within reach of animals."
>
> "In contrast, degree of use may be increased where range is to be grazed for short periods or rested during the growing season after grazing."
>
> "A three-year study on these areas indicated that 40% use of blue grama was too light and that old stems accumulated in the plants, increasing spotty use in subsequent years. Plants grazed at 50% use remained vigorous and utilization in subsequent years was quite uniform. Plants grazed at 70% use were greatly reduced in vigor and many died. Under the conditions of this study, proper use of blue grama was between 50 and 60%, and relative proper use of curlymesquite in association with blue grama was between 35 and 40%."

The 20%/40% forage utilization requirement in RM-217 cannot be attributed to Schmutz (1978). Instead, the mean forage utilization rates in Schmutz (1978) directly contradict RM-217 requirements.

Wasser (1982): The objective of Wasser 1982 is described below (Wasser 1982, p. 22):

> "This handbook is intended to present ecological information about 98 of the more important species commonly used in revegetation and reclamation projects in the Western United States."
>
> "The species included in the handbook usually are important and commonly used for stabilizing and reclaiming surface mined and other disturbed lands."
>
> "Species reviewed herein are suggested for use only in the reclamation and rehabilitation of disturbed lands on suitable sites and accompanied by skillful management... **Some plants may be poisonous or toxic to animal life and the user should obtain further information concerning the safe grazing/browsing of such materials before using them.**"
> [Bold emphasis added.]

At 347 pages, the Wasser (1982) handbook is not a reasonable or sensible source of authoritative information to use for setting limits on wildlife and livestock utilization of grasses and forbs in the forests of the southwestern United States for the benefit of "many of the prey species." The purpose of the book is to provide information for the selection of plant species used for soils stabilization and reclamation.

Conclusion:

The only references in RM-217 cited in support of required grazing limits are shown above. The RM-217 statement is incorrectly attributed to Schmutz (1978) and Wasser (1982), and therefore, the stated forage utilization limits throughout RM-217 are arbitrary, capricious and unsupported by cited literature.

Information quality issues:

☑ One or more cited references not materially related to statement
☐ Cited reference is misrepresented
☑ Statement directly contradicted by one or more references
☐ Substantive errors
☐ Secondary citations

Petition section(s) referring to the subject statement:

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A3.51.1 - Appendix 2, Goshawk Diet Table - prey species entries incorrect

RM-217, p. 51:

Review objective:

Verify absolute and percentage values in the goshawk diet table.

Notes:

Numerous errors are included in the goshawk prey species table of Appendix 2, and in related discussion. Several examples follow:

The sum of the number of prey is not correct for Mannan and Boals (1990) and Kennedy (1991); summed percentages in diets do not sum to 100 for Reynolds and Meslow (1984), Mannan and Boals (1990) and Kennedy (1991). (Actual sums are 94%, 74% and 127%, respectively).

Dietary composition in Appendix 3 does not match table entries in Appendix 2. For example, robin discussion on RM-217 p. 53 does not match entries in Appendix 2. According to RM-217, p. 53, "no robins were noted in prey deliveries to 8 goshawk nests on the North Kaibab in northern Arizona (Mannan and Boals (1990)), but 7 are listed for Mannan and Boals (1990) in Appendix 2.

From RM-217, p. 72: "In eastern Oregon, 7.5% of goshawk prey remains were Steller's jays (Reynolds and Meslow 1984)." In Appendix 2, Steller's jays are listed as 13% of the goshawk diet for Reynolds and Meslow (1984).

From RM-217, p. 72: "Over 11% of the prey deliveries to 7 goshawk nests in north-central New Mexico were Steller's jays (Kennedy 1991)." In Appendix 2, Steller's jays are listed as 9% of the goshawk diet for Kennedy (1991).

The number of prey for Mannan and Boals (1990) in RM-217 Appendix 2 do not correspond to entries in Mannan and Boals (1990), Table 2, p. 9.

Conclusion:

The table in Appendix 2 was used to develop the list of 14 selected goshawk prey species that are the subject of RM-217 Appendix 3, which in turn was used to develop foraging area desired conditions and management criteria, including special habitat attributes in RM-217 Table 6 (p. 17) and desired forest conditions in Table 7 (p. 19). Tables 6 and 7 are critical decision models used for the synthesis of desired forest conditions in foraging areas in RM-217, Table 1 (p. 7) and foraging area management recommendations in RM-217 Table 2 (p. 7).

It must be assumed that the goshawk diet table in RM-217 Appendix 2 is correct and properly supports the published, desired foraging area attributes and management recommendations.

However, Appendix 2 has been shown above to be incorrect. Therefore, RM-217 Tables 1, 2, 6 and 7 are incorrect because they are based on incorrect data, as is all discussion of these tables and related recommendations in RM-217. All foraging area recommendations must be assumed to have been based on the incorrect RM-217 Appendix 2 and are, therefore, invalid.

Information quality issues:

☐ One or more cited references not materially related to statement
☐ Cited reference is misrepresented
☐ Statement directly contradicted by one or more references
☑ Substantive errors
☐ Secondary citations

Petition section(s) referring to the subject statement:

☐ I	☐ VII
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A3.53.1 - American robin habitat canopy cover statement not supported

RM-217, p. 53:

> "In riparian habitat, canopy cover was 'good' above robin nests and 'fair' below the nests (Stauffer and Best 1986)."

Review objective: Verify source, check canopy cover.

Notes:

Stauffer and Best (1986): the year is incorrectly specified in RM-217 as 1986. The correct year is 1980, as listed in the RM-217 references section.

This paper was reviewed to determine if "canopy cover", or the words "good" and "fair", were used to describe American robin habitat.

Stauffer and Best (1980) did not measure canopy cover. Only "vertical patchiness of vegetation" and "vertical stratification of vegetation" were measured by assigning binary values to classes of the two attributes.

Robins and "cover" were never discussed in Stauffer and Best. The only possible interpretation would come from Table 7, p. 9 - significant relationships between bird densities and microhabitat variables. None of the two vertical cover variables described above were significant. In fact, with robin densities as the dependent variable, only "slope", "grasslike", and "snag size preference" were given as statistically significant predictors (Stauffer and Best 1980, p. 9). However, the corresponding R^2 of 0.029 hardly makes mention worthwhile.

Conclusion:

It is not possible to attribute the RM-217 statement to this reference. The RM-217 statement remains unverified.

Information quality issues:

☐ One or more cited references not materially related to statement
☑ Cited reference is misrepresented
☐ Statement directly contradicted by one or more references
☐ Substantive errors
☐ Secondary citations

Petition section(s) referring to the subject statement:

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☐ IV	☐ X
☐ V	☑ XI
☐ VI	

A3.54.1 - American robin aversion to clearcuts is contradicted by cited reference

RM-217, p. 54:

American Robin:

> "Sites that were clearcut had the lowest densities of breeding birds, 0.5 birds per 100 acres (Haldeman 1968, Szaro and Balda 1979)."

Review objective:

Verify clearcut statement.

Notes:

Szaro and Balda (1979) is not listed in RM-217 references. Instead, there is a Szaro and Balda (1979a) and Szaro and Balda (1979b). The former was unavailable in either of two university libraries and was not reviewed. Szaro and Balda (1979b), titled "Effects of harvesting ponderosa pine on nongame bird populations", discusses bird populations following silvicultural treatments in ponderosa pine forests.

Haldeman (1968): thesis - Interlibrary loan request not successful, not reviewed

Szaro and Balda (1979b): in Table 3, p. 5 (Szaro and Balda 1979b), the lowest density of breeding robins was in the control (uncut) watershed, where no robins were found. The control is therefore the opposite of a clearcut. The authors commented on this observation on p. 6:

> "The rock wren, robin and western wood pewee bred only on treated plots, whereas the acorn woodpecker was found exclusively on the severely thinned plot."

Conclusion:

The RM-217 statement is directly contradicted by the cited supporting reference of Szaro and Balda (1979b).

Information quality issues:

☐ One or more cited references not materially related to statement
☑ Cited reference is misrepresented
☑ Statement directly contradicted by one or more references
☐ Substantive errors
☐ Secondary citations

Petition section(s) referring to the subject statement:

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A3.54.2 - American robin preferences and adverse habitats not supported

RM-217, p. 54:

> "Management Effects"
>
> "Robins appear to be abundant in unlogged and logged forests with residual large trees. Robin densities were low in clearcut areas (Szaro and Balda 1979, Stauffer and Best 1980, Medin 1985)."

Review objective:

Check "unlogged" in Szaro and Balda.

Notes:

Szaro and Balda (1979) is not listed in RM-217 references. Instead, there is a Szaro and Balda (1979a) and Szaro and Balda (1979b). The former was unavailable in either of two university libraries and was not reviewed. Szaro and Balda (1979b), titled "Effects of harvesting ponderosa pine on nongame bird populations", discusses bird populations following silvicultural treatments in ponderosa pine forests.

Szaro and Balda (1979b): in Table 3, p. 5 (Szaro and Balda 1979b), the lowest density of breeding robins was in the control (uncut) watershed, where no robins were found. The authors commented on this observation on p. 6:

> "The rock wren, robin and western wood pewee bred only on treated plots, whereas the acorn woodpecker was found exclusively on the severely thinned plot."

The Szaro and Balda citation does support low robin densities in clearcuts, but not an abundance in unlogged forests.

Stauffer and Best (1980): here, Stauffer and Best conducted bird counts in Iowa and classified observations across 6 habitat categories (Stauffer and Best, p. 6). The words "unlogged", "logged" and "clearcut" were never used. Instead, they interpreted population counts among the habitat categories as proxies for tolerance of habitat changes. The six habitat classes used are: herbaceous, savannah, scrub, wooded edge, floodplain woodland, and upland woodland.

The utility of microhabitat variables for the prediction of robin populations was exceedingly poor (R^2=0.029) (Stauffer and Best 1980, Table 7, p. 9).

The authors then constructed a table showing "Predicted effects on breeding-bird densities of various habitat alterations of closed-

canopy riparian woodlands." (See Stauffer and Best 1980, Table 8, p. 11.) Development of table entries was described on p. 12:

> "Knowledge of the species' relationships to nest sites, habitat patch width, general habitat, and microhabitat characteristics (Tables 1-3, 5-7) were used to identify the habitat needs of each species. This information was then used to predict the effects of various habitat alterations upon the species (Table 8)."

Hence, the predicted effects were based on the authors' gleaning and synthesis of identified sources. In their opinion, from their Table 8, American robins would be eliminated if "All woody vegetation [was] removed, resulting in pastures or hayfields." Recall this applies to "closed-canopy riparian woodlands" in Iowa, and cannot be construed to imply this was the authors' finding for clearcuts, a regeneration treatment typified by a cover transition, in coniferous forests of the arid southwest.

Interestingly, the highest count for American robins was in savannah, at levels 122% higher than both wooded edge and floodplain woodland, and 6.1 times higher than upland woodland (Stauffer and Best 1980, Table 6, p. 8).

The authors presented this conclusion about the expected impacts of habitat alterations (Stauffer and Best 1980, p. 12):

> "Of the species discussed, American robins, house sparrows, and starlings have adapted well to urban situations and total population numbers would be least affected by alteration of natural habitats (Graber and Graber 1963)."

The Stauffer and Best (1980) study from riparian forests in Iowa does not support the RM-217 statement in relation to southwestern forests, and it is an invalid citation.

Medin (1985): Medin did not work with clearcuts. He contrasted bird populations on an uncut control with units cut by diameter limit, and no mention is made of "residual large trees".

Medin 1985, p. 1:

> "Diameter-cut logging is the removal of all merchantable trees above a specified diameter breast height (d.b.h.) (Ford-Robertson 1971)."
>
> "Trees on watershed SC-6 were cut commercially to a 10-inch (25-cm) minimum diameter (breast height) in three separate and well-spaced cutting units (fig. 1)."
>
> "All tree stems greater than 10 inches (25 cm) d.b.h. were felled within defined cutting units."

Medin 1985 does not support the GSC statement because there were no "residual large trees".

Conclusion:

Cited references do not support the RM-217 statement.

Information quality issues:

☐ One or more cited references not materially related to statement
☑ Cited reference is misrepresented
☑ Statement directly contradicted by one or more references
☐ Substantive errors
☐ Secondary citations

Petition section(s) referring to the subject statement:

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A3.57.1 - Blue grouse - rephrasing of passage from cited reference is misleading

RM-217, p. 57:

Blue grouse:

> "Zwickel and Bendell (1985) believe that the level of canopy cover is the key element in the abundance of blue grouse. The amount and diversity of understory vegetation appears inversely proportional to overstory shading, especially at the highest level of canopy cover (Frandsen 1980)."

Review objective:

Check for canopy cover measurement methods.

Notes:

Zwickel and Bendell (1985) is essentially a status-of-our-knowledge paper centered on their work on Vancouver Island, B.C. There is no original canopy cover work in this paper, and their own cited canopy cover values are not, by intention, accompanied with discussion of measurement methods.

The RM-217 statement and citation are not accurate in the attribution to Zwickel and Bendell (1985). The first sentence changed the primary point of Zwickel and Bendell, and the second sentence should also have been cited from their paper.

Note the similarities between the RM-217 statement and Zwickel and Bendell (1985), p. 187:

> "We believe such an understory is a requirement for maintenance of viable populations of blue grouse. The abundance and diversity of understory vegetation is approximately inverse to coverage of the overstory, at least during the later stages of canopy closure (Frandsen 1980)."

Though the two attributes of understory and overstory are commonly related in practice, the rewording, in the first Zwickel and Bendell sentence, from "such an understory is a requirement" to "the level of canopy cover is the key element" massages Zwickel and Bendell's statement to support the emphasis of RM-217 on overall canopy cover. (The association between the two sentences suggests strongly that the rewording took place. However, this may not be exactly the case - see below.) In the second sentence, the rewording from "at least during the later stages of canopy closure" to "especially at the highest level of canopy cover" alters the context of Zwickel and Bendell's discussion and attribution to Frandsen. In the context of RM-217, with the overall desired emphasis on higher levels of canopy cover, the GSC passage is an understatement of Zwickel and Bendell's primary points in their paper, particularly in regard to "the level of canopy cover is the key element".

Zwickel and Bendell, p. 185, abstract, first sentence:

> "Blue grouse (Dendragapus obscurus) may increase spectacularly in lowland Pacific coast forest that has been logged by clear-cutting."

Zwickel and Bendell, p. 185:

> "Differences in numbers of grouse between old growth and newly logged forest may represent many orders of magnitude (Nieerleitner 1982), certainly exceeding 50 in some cases."

Zwickel and Bendell, p. 187:

> "Obviously, we believe forest canopy closure is a key element leading to the elimination of blue grouse from an area."

This last sentence, in referring to canopy closure in regenerated clearcuts, might also be read as the source for the first sentence in the RM-217 passage. If so, there is a great difference in meaning between "the key element in the abundance of blue grouse", and the original Zwickel and Bendell statement, "a key element leading to the elimination of blue grouse".

Later in RM-217, on p. 57, the issue of canopy cover is better accommodated:

> "The key element associated with breeding and brood rearing is the extent to which forest canopy remains open, open canopies allow sufficient light penetration for the development of herbaceous and shrub species (Zwickel and Bendell 1985)."

Thus, for blue grouse, the Zwickel and Bendell citation is at best careless, and it de-emphasizes (and avoids) the value of clearcuts and the ensuing rapid crown closure in regeneration that Zwickel and Bendell found to be strongly detrimental to sustained grouse populations.

Frandsen 1980: secondary citation (attribution to Frandsen was by Zwickel and Bendell 1985), not reviewed.

Conclusion:

Rephrasing of Zwickel and Bendell (1985) passage is deceptive and misleading. The Frandsen (1980) reference was transferred with the rephrased passage, and there is no indication the citation was actually used.

Whereas Zwickel and Bendell emphasize the importance and high correlation of clearcuts with high blue grouse populations

(particularly for breeding), and further emphasize that the closing of the canopy following regeneration is, in fact, strongly detrimental to blue grouse, in RM-217, their points are obtusely avoided with careful statements that clearly avoid clearcut issues, and instead the GSC obfuscates with disingenuous terminology such as "level of canopy cover", "amount and diversity of understory vegetation", and "open canopies allow sufficient light penetration".

Information quality issues:

☐ One or more cited references not materially related to statement
☑ Cited reference is misrepresented
☐ Statement directly contradicted by one or more references
☐ Substantive errors
☑ Secondary citations

Petition section(s) referring to the subject statement:

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A3.57.2 - Grazing claim not supported

RM-217, p. 57:

Blue Grouse:

> "Excessive grazing can have localized, detrimental effects on breeding and brood-rearing habitat (Stauffer 1983, Zwickel and Bendell 1985)."

Review objective:

Check sources.

Notes:

Stauffer (1983): Ph.D. dissertation. Interlibrary loan request not successful, not reviewed.

Zwickel and Bendell (1985): never mention grazing.

Conclusion:

Attribution of grazing effects, the main and only subject of the RM-217 sentence, cannot be attributed to Zwickel and Bendell (1985).

Information quality issues:

☑ One or more cited references not materially related to statement
☐ Cited reference is misrepresented
☐ Statement directly contradicted by one or more references
☐ Substantive errors
☐ Secondary citations

Petition section(s) referring to the subject statement:

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A3.63.1 - Hairy woodpecker - "Large diameter snags" statement inserted into referenced passage and incorrectly attributed

RM-217, p. 63:

Hairy Woodpecker:

> "Additionally, even-age management, short stand rotation, and removal of cull trees reduces snag densities, especially large diameter snags (McPeek et al. 1987)."

Review objective:

Check source.

Notes:

The original statement and citation to McPeek et al. (1987) require a broadened review as follows:

From RM-217, p. 63:

> "Management Effects
>
> "Snags are an important habitat component for many woodpeckers and other cavity-nesting species. Low snag availability resulting from timber harvest, fuelwood removal, or intense surface fires may adversely affect populations of these snag-dependent goshawk prey (Balda 1975, Thomas et al. 1979). Additionally, even-age management, short stand rotation, and removal of cull trees reduces snag densities, especially large diameter snags (McPeek et al. 1987). Snag availability in managed stands can be increased by:
> 1) leaving snags during timber harvest, and
> 2) creating snags using herbicides, topping, or girdling (Bull and Partridge 1986)."

The above RM-217 passage was in fact copied from McPeek et al. (1987) and then altered. From McPeek, p. 253 (Bold type sentence is paper title):

> "**Bark-foraging bird abundance unaffected by increased snag availability in a mixed mesophytic forest.** --Snags are an important habitat component for many bird species, and low snag availability may adversely affect populations of birds that nest in or forage on snags (Balda 1975, Thomas et al. 1979). Silvicultural practices such as even-aged management, short stand rotation, and removal of cull trees reduce natural snag densities.
> "Snags can be provided for birds by managing old-growth forest or by leaving snags during timber harvest. Snags also can be created using herbicides, topping, and girdling to increase snag availability in managed stands (Bull and Partridge 1986)."

Changes made to McPeek's passage include:

-The phrase "from timber harvest, fuelwood removal, or intense surface fires" was inserted in the first sentence.

-The phrase "populations of birds that nest in or forage on snags" was replaced with "snag-dependent goshawk prey".

-The phrase "reduce natural snag densities" was extended to "reduces snag densities, especially large diameter snags", and was falsely attributed to McPeek.

- The phrase "by managing old-growth forest" was deleted.

Clearly, RM-217 authors were committed to achieving snag requirements that met preconceived notions of desired conditions for goshawk prey. By revising McPeek's statement and inserting "large diameter snags", they attempted to buttress their large snag requirements by inserting a false precept - not once did McPeek mention "large diameter snags". In fact, for his study of the population response of bark-foraging birds to snag recruitment in a hardwood forest of Kentucky, he mentioned just one snag size criteria (McPeek et al. 1987, p. 253):

> "Trees suitable for injection were >= 10 cm dbh (diameter at breast height) and >5 m tall, thus meeting minimum snag requirements for most cavity-nesting birds (Conner 1978, Evans and Conner 1979)."

It is not feasible that 10 cm (4") snags could be interpreted as being "large diameter snags". The tendency to embellish attributed statements is consistent with the invented 20" dbh snag requirement that was falsely attributed to Horton and Mannan (see A3.67.1).

In addition, the extraction and alteration of the McPeek passage was done to buttress the proposition on RM-217 p. 63 that snag densities must be increased to sustain hairy woodpecker populations. It is not possible to reconcile this approach with reason when McPeek's conclusion is incorporated into the title of his paper.

Conclusion:

The complete and unaltered passage should have been quoted and credited to McPeek et al. (1987). Instead, it was selectively revised and attributions were maintained. The clause "especially large diameter snags" was inserted and incorrectly attributed to McPeek et al. (1987).

Information quality issues:

☐ One or more cited references not materially related to statement
☑ Cited reference is misrepresented
☐ Statement directly contradicted by one or more references
☑ Substantive errors
☐ Secondary citations

Petition section(s) referring to the subject statement:

☐ I	☐ VII
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A3.63.2 - Impact of clearcuts on hairy woodpeckers misrepresented

RM-217, p. 63:

Hairy Woodpecker:

> "Szaro and Balda (1982) studied the effects of timber harvest on breeding bird densities in ponderosa pine forests on the Coconino National Forest, Arizona. During all years of the study, hairy woodpeckers were found in all types of harvested stands except clear-cuts, including:
>
> 1) untreated areas where trees had not been removed for 60 years;
> 2) light harvests in which large trees and dense thickets were selectively removed;
> 3) moderate harvests in strips alternating with strips of cleared areas and unharvested areas; and
> 4) heavy cuts where areas were severely thinned, and slash was piled in regularly spaced windrows.
>
> Hairy woodpecker densities averaged about 3 pairs per 100 acres, and did not differ among treatments (Szaro and Balda 1982, 1986)."

Review objective:

Check sources for clearcut findings, and verify the phrase "did not differ among treatments".

Notes:

To understand the context of the RM-217 passage, background issues and several papers must be discussed.

Szaro and Balda (1982) title:

> "Selection and monitoring of avian indicator species: an example from a ponderosa pine forest in the Southwest"

Szaro and Balda (1986) title:

> "Relationships among weather, habitat structure and ponderosa pine forest birds"

Szaro and Balda (1979b) title:

> "Effects of harvesting ponderosa pine on nongame bird populations"

Brown et al. (1974)[5] title:

[5] Not cited directly in RM-217; cited by RM-217 references.

"Opportunities for increasing water yields and other multiple uses values on ponderosa pine forest lands"

Szaro and Balda (1982) and Szaro and Balda (1986) refer to the same study described in detail in Szaro and Balda (1979b), which in turn describes silvicultural treatments implemented on the Beaver Creek Watershed on the Coconino National Forest in Arizona.

In addition, Szaro and Balda (1979b) refer repeatedly (p.2-3) to **Brown et al. (1974)** for treatment details. Szaro and Balda (1986) state on p. 253: "Habitat manipulation differed on the 4 treated study areas (Fig. 1) (Brown et al. 1974)." Table 1 of Szaro and Balda (1982) is duplicated, for demonstration purposes, from Szaro and Balda (1979b) Table 3, p. 5, except that the "clearcut" column was not reproduced.

All three Szaro and Balda papers are cited in RM-217. **Brown et al. (1974)** was not. The Szaro and Balda papers may be briefly summarized as follows:

Szaro and Balda (1979b) is an original study with primary data. No statistical comparisons were made of bird counts.

Szaro and Balda (1982) discuss bird indicator species. Table 3 in Szaro and Balda (1979b) was partially reproduced in Szaro and Balda (1982) - however, bird counts in clearcuts were not reproduced in their table.

Szaro and Balda (1986) did not present bird counts as in Szaro and Balda (1979b). A summary table of counts was presented in Table 2 by site (treatment) and means over 3 years, all treatments combined, control included.

Brown et al. (1974) described the primary purpose of the Beaver Creek study on p. 1:

"The general objective of the project as assigned in the 1960's was to evaluate land management measures designed to increase water yields."

Objectives were broadened in 1971 to include multiple-use goals, modeling, economics, and planning. Five initial, primary silvicultural treatments were described as (p. 10-12):

1. Thinning by group selection on Watershed 17 in 1969.
2. Stripcut for water yield on Watershed 9 in 1967-68.
3. Strip shelterwood cut on Watershed 14 in 1970-71.
4. Strip shelterwood cut on Watershed 16 in 1971-72.
5. Total clearcut on Watershed 12 in 1966-67.

From Szaro and Balda (1979b):

"Watershed 13 was left untreated as the control area."

The objective of the clearcut treatment was explained in several locations by Brown:

Brown et al. (1974), p. 3:

> "The treatment was designed to test the effects of clearcutting all the woody vegetation on the watershed and windrowing the resultant slash (Brown et al. 1974)."

Brown et al. (1974), p. 12:

> "Total clearcut on Watershed 12 in 1966-67 (fig. 11). -- This watershed was essentially removed from timber production... This treatment is not intended to have operational potential but rather is an analytical benchmark against which to compare less severe treatments."

Brown et al. (1974), p. 18:

> "On Watershed 12, all timber overstory was removed."

There was no indication by **Brown et al. (1974)** that any snags had been retained on the 455-acre clearcut on Watershed 12. A U.S. Forest Service scientist familiar with the Beaver Creek study affirmed that all snags were removed (personal communication, Dr. Gerry Gottfried, USDA Forest Service, Rocky Mountain Experiment Station, Phoenix, AZ). This is consistent with the intention expressed in **Brown et al. (1974)** that the Watershed 12 clearcut be the most "severe" treatment possible relative to other treatments.

Szaro and Balda 1979b (p.2-3) studied bird populations on large plots within Watershed 13 (control), Watershed 8 (light thinning in understory and overstory, treated in 1974), Watershed 14 (irregular strip shelterwood), Watershed 17 (group selection, called "severely thinned" by Szaro and Balda), and Watershed 12 (total clearcut).

In the RM-217 passage above, it was stated that "During all years of the study, hairy woodpeckers were found in all types of harvested stands except clear-cuts..."

Szaro and Baldo (1979b), Table 3, p.5, does indeed indicate no Hairy woodpeckers were found. However, the objective of **Brown et al. (1974)** was to implement the most severe possible treatment, including the removal of snags. This practice was implemented for a specific scientific purpose, and is not compatible with applied U.S. Forest Service clearcutting practices. It may be rather difficult to locate cavity nesters when all snags have been removed to meet specific criteria of the sample design - for a research hydrology objective. The failure of the GSC to report the details of the

clearcut treatment is a misrepresentation of the work of Szaro and Balda.

In the RM-217 passage above, it was also stated that:

> "Hairy woodpecker densities averaged about 3 pairs per 100 acres, and did not differ among treatments (Szaro and Balda 1982, 1986)."

It is not clear where Szaro and Balda reported this. Szaro and Balda (1986) did not report densities by species, nor among treatments by species, except for presence/absence in Table 2 (p. 256). Szaro and Balda (1982) included the partially duplicated table from Szaro and Balda (1979b) for demonstration purposes. In Sazaro and Balda (1979b), Table 3 (p. 5) shows considerable variation for mean hairy woodpecker populations among treatments (significance not reported).

Conclusion:

The work of Szaro and Balda, and **Brown et al. (1974)**, was misrepresented with regard to the absence of hairy woodpeckers in clearcuts by the failure of the GSC to report snags had been removed to meet research hydrology objectives. The purported lack of differences in hairy woodpecker populations among treatments is not supported by cited references, and nor by the original study described in Szaro and Balda (1979b).

Information quality issues:

☐ One or more cited references not materially related to statement
☑ Cited reference is misrepresented
☐ Statement directly contradicted by one or more references
☐ Substantive errors
☐ Secondary citations

Petition section(s) referring to the subject statement:

☐ I	☐ VII
☐ II	☐ VIII
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A3.66.1 - Mourning doves - Crown density value not supported by reference

RM-217, p. 66:

Mourning Dove:

> "An important center of activity associated with fledgling mourning doves are 'reference areas' (RAs) (Hitchcock and Mirarchi 1986). In eastern juniper (Juniperus virginiana) and loblolly pines (Pinus taeda), trees in RAs tended to have large dense crowns (width average 26.3 feet; 76% average crown density)."
>
> .
> .
> .
>
> "RAs were located on the ground or on limbs of trees. These sites were characterized by 'dense overhead canopies interspersed with openings' (Hitchcock and Mirarchi 1986)."

Review objective:

Check canopy cover measurement methods - did Hitchcock measure canopy cover or canopy density, and if so, how?

Notes:

Hitchcock and Mirarchi (1986): did not measure or discuss canopy cover. Hitchcock and Mirarchi referred to "dense overhead cover interspersed with openings" in a citation credited to "Grand (1984)" - an M.S. thesis at Auburn University.

Conclusion:

The "76% average crown density" phrase is not supported by the Hitchcock and Mirarchi (1986) citation. Because the 76% figure could not be found in the cited reference, it is held here to not be materially related to the first passage, second sentence.

In the second passage, the second sentence uses a secondary citation pointing to "Grand (1984)".

Information quality issues:

☑ One or more cited references not materially related to statement
☐ Cited reference is misrepresented
☐ Statement directly contradicted by one or more references
☐ Substantive errors
☑ Secondary citations

Petition section(s) referring to the subject statement:

☐ I	☐ VII
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☐ VI	

A3.67.1 - Northern flicker snag preference not supported

RM-217, p. 67:

Northern Flicker:

> "In the Santa Catalina Mountains, Arizona, the northern flicker preferred ponderosa pine snags greater than 20 inches DBH in stands that had never been logged (Horton and Mannan 1988)."

Review objective:

Confirm source, contrast with Management Effects on RM-217 p. 68.

Notes:

Horton and Mannan (1988):

The RM-217 statement is misleading in that it may be read to conclude flickers preferred virgin stands. In truth, Horton and Mannan stated, on p. 37:

> "The study area was never treated with prescribed fire before this study or extensively logged."

In fact, there was a history of at least some timber harvesting on the sampled stands. In addition, Horton and Mannan did not sample actively managed stands, and did not attempt to offer any contrasts in flicker habitat preferences for cut versus uncut stands.

Horton and Mannan did not explicitly study northern flickers. Instead, they were investigating, as the title of their publication reveals, the "Effects of prescribed fire on snags and cavity-nesting birds in southeastern Arizona pine forests." They state clearly (Horton and Mannan 1988, p. 40) that insufficient data had been collected to make inferences on northern flickers alone:

> "We examined nests of hairy woodpeckers, acorn woodpeckers, and northern flickers together because of the small sample of nests located (n=15) and because they nested in snags with similar characteristics."

It was incorrect for RM-217 authors to present a definitive "northern flicker" preference for "snags greater than 20 inches". Horton and Mannan present no such 20"+ snag preference data or statements for flickers or the "woodpecker" class. The closest related statement is from Horton and Mannan, p. 42:

> "The numerous small (<15 cm dbh) snags created during fires frequently showed evidence of use by foraging woodpeckers."

Since 15 cm is about 6 inches, the source of the 20" nest snag preference for northern flickers remains undocumented and unverified.

Conclusion:

Horton and Mannan (1988) was misrepresented, and there is no basis in the RM-17 statement for the phrase "the northern flicker preferred ponderosa pine snags greater than 20 inches DBH", as attributed to Horton and Mannan.

Information quality issues:

☐ One or more cited references not materially related to statement
☑ Cited reference is misrepresented
☑ Statement directly contradicted by one or more references
☑ Substantive errors
☐ Secondary citations

Petition section(s) referring to the subject statement:

☐ I	☐ VII
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☐ IV	☐ X
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☐ VI	

A3.67.2 - Northern flicker response to clearcuts incomplete

RM-217, p. 67:

Northern Flicker:

> "Only in areas that were clearcut did the flicker show a negative population response (Kilgore 1971, Franzreb and Ohmart 1978, Szaro and Balda 1979b, Mannan and Meslow 1984, Medin 1985)."

Review objective:

Check Szaro and Balda 1979b.

Notes:

Szaro and Balda 1979b: as discussed for the hairy woodpecker (see A3.63.2), the treatment at the Beaver Creek Watershed, Watershed 12, was a total clearcut, and no snags were retained as required by the study design for the research project. It is not correct to refer to population changes of cavity nesters in this particular clearcut without noting this important aspect of the study.

Conclusion:

The Szaro and Balda (1979b) citation should be made only with clarification.

Information quality issues:

☐ One or more cited references not materially related to statement
☑ Cited reference is misrepresented
☐ Statement directly contradicted by one or more references
☐ Substantive errors
☐ Secondary citations

Petition section(s) referring to the subject statement:

☐ I	☐ VII
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☐ III	☐ IX
☐ IV	☐ X
☐ V	☑ XI
☐ VI	

A3.68.1 - Northern flicker aversion to clearcuts is incorrect

RM-217, p. 68:

Northern Flicker:

> "Management Effects
>
> "Szaro and Balda (1982) studied the effects of timber harvest on breeding bird densities in ponderosa pine forests on the Coconino National Forest, Arizona. During all years of the study, northern flickers were found in all types of harvested stands, except clear-cuts, including:
>
> 1) untreated areas where trees had not been removed for 60 years;
> 2) light harvests in which large trees and dense thickets were selectively removed;
> 3) strips of moderate harvest alternating with strips of cleared areas and unharvested areas; and
> 4) heavy cuts where areas were severely thinned and slash was piled at regularly spaced windrows.
>
> Northern flicker densities averaged about 3 pairs per 100 acres and in ponderosa pine did not differ among treatments. No density values were available for clear-cuts (Szaro and Balda 1982, 1986)."

Review objective:

Check "except clear-cuts" - was this because they did not study clearcuts? Why were densities not available?

Notes:

Issues here are similar to that previously described for the hairy woodpecker (see A3.63.2).

The second RM-217 sentence above implies strongly that northern flickers were not found in clearcuts. Because the sampled clearcut had all snags removed as an important aspect of the research project, it is incorrect to describe changes in the population of cavity nesters without also informing readers of the study design, objectives and treatment details.

Further, it is readily discerned from Szaro and Balda (1986), Table 2, p. 256, that northern flickers were indeed found in the clearcut. Szaro and Balda (1986), on p. 253, direct the reader to their detailed paper: "For a more complete description of the study plots see Szaro and Balda (1979a)." In Szaro and Balda (1979b), Table 3, p. 5, shows 0.8 flicker pairs per 40 ha in the clearcut plot, and populations did vary among treatments (significance not reported).

The last sentence of the RM-217 passage, "No density values were available for clear-cuts (Szaro and Balda 1982, 1986)", is correct for Szaro and Balda (1982) because it was not the source of the original research, and Szaro and Balda (1982) left off the clearcut column of the table otherwise duplicated from Szaro and Balda

(1979b). Though density values in clearcuts were also unavailable in Szaro and Balda (1986), flicker presence, as discussed above, was noted in Table 2, p. 256, and readers were directed to Szaro and Balda (1979b) for more details of the study.

Conclusion:

The following RM-217 sentences are incorrect, and are not supported by the cited references:

> "During all years of the study, northern flickers were found in all types of harvested stands, except clear-cuts..."
>
> "No density values were available for clear-cuts (Szaro and Balda 1982, 1986)."

If secondary citations had not been used, and original studies consulted, the northern flicker densities in clearcuts would have been properly located and correctly reported.

Information quality issues:

☐ One or more cited references not materially related to statement
☑ Cited reference is misrepresented
☐ Statement directly contradicted by one or more references
☑ Substantive errors
☑ Secondary citations

Petition section(s) referring to the subject statement:

☐ I	☐ VII
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☐ VI	

A3.68.2 - Red-naped sapsucker abundance in goshawk diet is exaggerated

RM-217, p. 68:

Red-Naped Sapsucker:

> "This species is 1 of 4 Sphyrapicus spp. found in forested habitats in the United States. Because of their abundance in forested habitats, members of this genus occur commonly in the diet of the goshawks (Reynolds and Meslow 1984, Kennedy 1991)."

Review objective:

Verify sources, and compare to the goshawk prey table in RM-217 Appendix 2.

Notes:

According to Appendix 2 (RM-217 p. 52), red-naped sapsuckers comprised 0.5% of goshawk diets in the Reynolds and Meslow (1984) study in Oregon, and 0% for Mannan & Boals (1990) in Arizona.

The same table shows that red-naped sapsuckers were not found in the goshawk diet for Kennedy (1991) in New Mexico, Schnell (1958) in California, or Meng (1959) in New York and Pennsylvania.

Conclusion:

RM-217 exaggerated the dietary contribution of Sphyrapicus spp., based on the provided citations and the goshawk diet table in RM-217, Appendix 2.

Information quality issues:

☐ One or more cited references not materially related to statement
☑ Cited reference is misrepresented
☐ Statement directly contradicted by one or more references
☑ Substantive errors
☐ Secondary citations

Petition section(s) referring to the subject statement:

☐ I	☐ VII
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☐ III	☐ IX
☐ IV	☐ X
☐ V	☑ XI
☐ VI	

A3.71.1 - Stated red squirrel cache site canopy cover value is incorrect

RM-217, p. 71:

Red squirrel:

> "Vahle and Patton (1983) found that 90% of 141 cache sites had canopy cover greater than 60%, and received additional shading from surrounding uneven-aged groups of trees."

Review objective:

Verify 60% canopy cover citation.

Notes:

Vahle and Patton (1983): On p. 14, Vahle and Patton did indeed report sampling 141 caches. They reported on p. 15, in a general statement, that "Tree groups provide shading of the cache from overhead and from the sides", but they did not provide information with the sentence to indicate the shading was from "surrounding uneven-aged groups of trees".

On p. 14, Vahle and Patton did report measuring "crown density" at the nest tree. They did not clarify exactly what "crown density" referred to. No methods were described, and no crown density values were reported.

Canopy cover is never mentioned in Vahle and Patton (1983). No canopy cover methods or measurements are described. No canopy cover results are reported.

Conclusion:

The cited reference to Vahle and Patton (1983) does not support the RM-217 statement for canopy cover. Because the cited reference does not discuss or present canopy cover data, it is considered to be "not materially related" to the RM-217 statement, which is consequently unsupported. Vahle and Patton (1983) is therefore misrepresented.

Information quality issues:

☑ One or more cited references not materially related to statement
☑ Cited reference is misrepresented
☐ Statement directly contradicted by one or more references
☐ Substantive errors
☐ Secondary citations

Petition section(s) referring to the subject statement:

☐ I	☐ VII
☐ II	☐ VIII
☐ III	☐ IX
☐ IV	☐ X
☐ V	☑ XI
☐ VI	

A3.71.2 - Mt. Graham red squirrel cache site canopy cover value is incorrect

RM-217, p. 71:

Red squirrel:

> "Canopy cover in a 33-foot-radius plot centered on primary middens averaged 89% (n=144) for Mount Graham red squirrels (Mannan and Smith 1991)."

Review objective:

Verify 89% canopy cover citation.

Notes:

Mannan and Smith (1991): Neither the 89% canopy cover value nor the sample size (n=144) can be confirmed in Mannan and Smith (1991).

Mannan and Smith sampled a total of 215 midden sites, including 100 "spruce/fir" sites and 115 "transition-zone" sites (pp. 1, 5; Tables 2, 7 and 9, unnumbered pages). Summary data is presented in Tables 2, 7 and 9. Related discussion concentrates on minimum canopy cover values. A sample size of n=144 is given only on p. 5:

> "Data were collected at 144 midden sites in 1989 and 71 in 1990."

Mean canopy cover is presented in their Table 9 for densiometer points located at plot centers, and 5 meters and 10 meters from plot center, for both spruce/fir and transition-zone plots. No mean value matches the 89% value provided in RM-217. Total mean plot canopy cover is not given.

Conclusion:

The RM-217 values of 89% canopy cover, n=144, cannot be confirmed in Mannan and Smith (1991).

Information quality issues:

☐ One or more cited references not materially related to statement
☐ Cited reference is misrepresented
☐ Statement directly contradicted by one or more references
☑ Substantive errors
☐ Secondary citations

Petition section(s) referring to the subject statement:

☐ I	☐ VII
☐ II	☐ VIII
☐ III	☐ IX
☐ IV	☐ X
☐ V	☑ XI
☐ VI	

A3.72.1 - Stand diameter and canopy cover requirements for red squirrels are incorrect

RM-217, p. 72:

Red Squirrel:

> "Management Effects
>
> "Vahle and Patton (1983) and Patton and Vahle (1986) recommended maintaining areas with closely spaced groups of trees of different ages and sizes. Stands of trees greater than 15 inches DBH are necessary to provide cone producing trees and nest trees... Closed canopies (basal areas >=200 square feet per acre) are also important for maintaining mesic conditions for middens and suitable cover for nesting."

Review objective:

Compare and contrast ba>=200.

Notes:

Vahle and Patton (1983):

Vahle and Patton (1983), on page 15, contrasted cache plot basal area with "timber plots" - the latter being forested areas outside of and beyond the 0.1-acre cache plots, but within the same stands:

> "Average basal area (197 square feet per acre) of cache plots exceeded basal area (142 square feet) of timber plots on all sites (P=0.05)."

It is irrational to change a mean basal area to a minimum requirement as shown above in RM-217 for "basal areas >= 200 square feet per acre", since for Vahle and Patton (1983), 50% of caches (approximately the lower half of the sampled population distribution) were below the GSC minimum.

On Patton and Vahle (1986), p. 49:

> "Stands on the study sites are multi-storied with average tree dbh ranging from 10 to 15 in."

Given the statement above in RM-217 ("Stands of trees greater than 15 inches DBH are necessary to provide cone producing trees and nest trees... "), Patton and Vahle (1986) should have had a difficult time locating red squirrels and caches. They did not. They also did not report a stand-level mean diameter.

Having already stated that study sites had an average dbh ranging from 10 to 15 inches (above), Patton and Vahle (1986) go on to speculate, on p. 51:

> "Mature stands have trees in the 15-20 in dbh range."

In no manner can this statement be interpreted to support the GSC statement - "Stands of trees greater than 15 inches DBH are necessary to provide cone producing trees and nest trees." The direct implication made by the GSC is that mean stand diameter must be larger than 15 inches, and few if any red squirrels could have therefore existed on the Patton and Vahle (1986) plots.

Vahle and Patton (1983) stated on p. 15:

> "The mean tree density on cache plots for all sites was 210 trees per acre with an average diameter of 13 inches."

Vahle and Patton 1983 did not provide mean diameter for timber plots beyond caches, nor did they provide stand-level mean diameters.

In addition, the RM-217 "closed canopy" requirement for squirrel middens is reiterated repeatedly on RM-217 p. 72 under "Habitat Management Recommendations" for red squirrels. In turn, this requirement was transferred to RM-217 p. 19, Table 7, for "desired forest conditions" for red squirrels in the emphasis on high canopy cover (class C). The result is to extrapolate the mean basal area of 200 square feet per acre found by Vahle and Patton (1983) on 0.1-acre *cache* plots, to "desired forest conditions" across the foraging area landscape - even though Vahle and Patton (1983) reported a non-cache mean basal area of 142 ft^2/acre.

Conclusion:

Neither Vahle and Patton (1983) or Vahle and Patton (1986) support the RM-217 statements above for the red squirrel. Both are misrepresented. It is an error to contend a mean value, reported in a cited reference, is a minimum requirement (i.e., "basal areas >=200 square feet per acre").

Information quality issues:

☐ One or more cited references not materially related to statement
☑ Cited reference is misrepresented
☐ Statement directly contradicted by one or more references
☑ Substantive errors
☐ Secondary citations

Petition section(s) referring to the subject statement:

☐ I	☐ VII
☐ II	☐ VIII
☐ III	☐ IX
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☐ VI	

A3.75.1 - Tassel-Eared squirrel statistic is incorrect

RM-217, p. 75:

Tassel-Eared Squirrel:

> "Ratcliff et al. (1975) found basal area of ponderosa pine was the most consistent variable associated with an index of squirrel density (r=0.88)."

Review objective:

Verify r.

Notes:

Ratcliff et al. (1975):

Ratcliff et al. found that the squirrel index was significantly correlated with the basal area of all ponderosa pine with r=0.72 (p. 285). They also found that:

> "A multiple correlation coefficient computed for the squirrel index as a dependent variable and basal area per acre of all ponderosa pine and number of squirrel nests per site as the independent variables yielded an "r" value of 0.88."

Conclusion:

The RM-217 statement is incorrect.

Information quality issues:

☐ One or more cited references not materially related to statement
☐ Cited reference is misrepresented
☐ Statement directly contradicted by one or more references
☑ Substantive errors
☐ Secondary citations

Petition section(s) referring to the subject statement:

☐ I	☐ VII
☐ II	☐ VIII
☐ III	☐ IX
☐ IV	☐ X
☐ V	☑ XI
☐ VI	

Appendix 4. Additional Figures

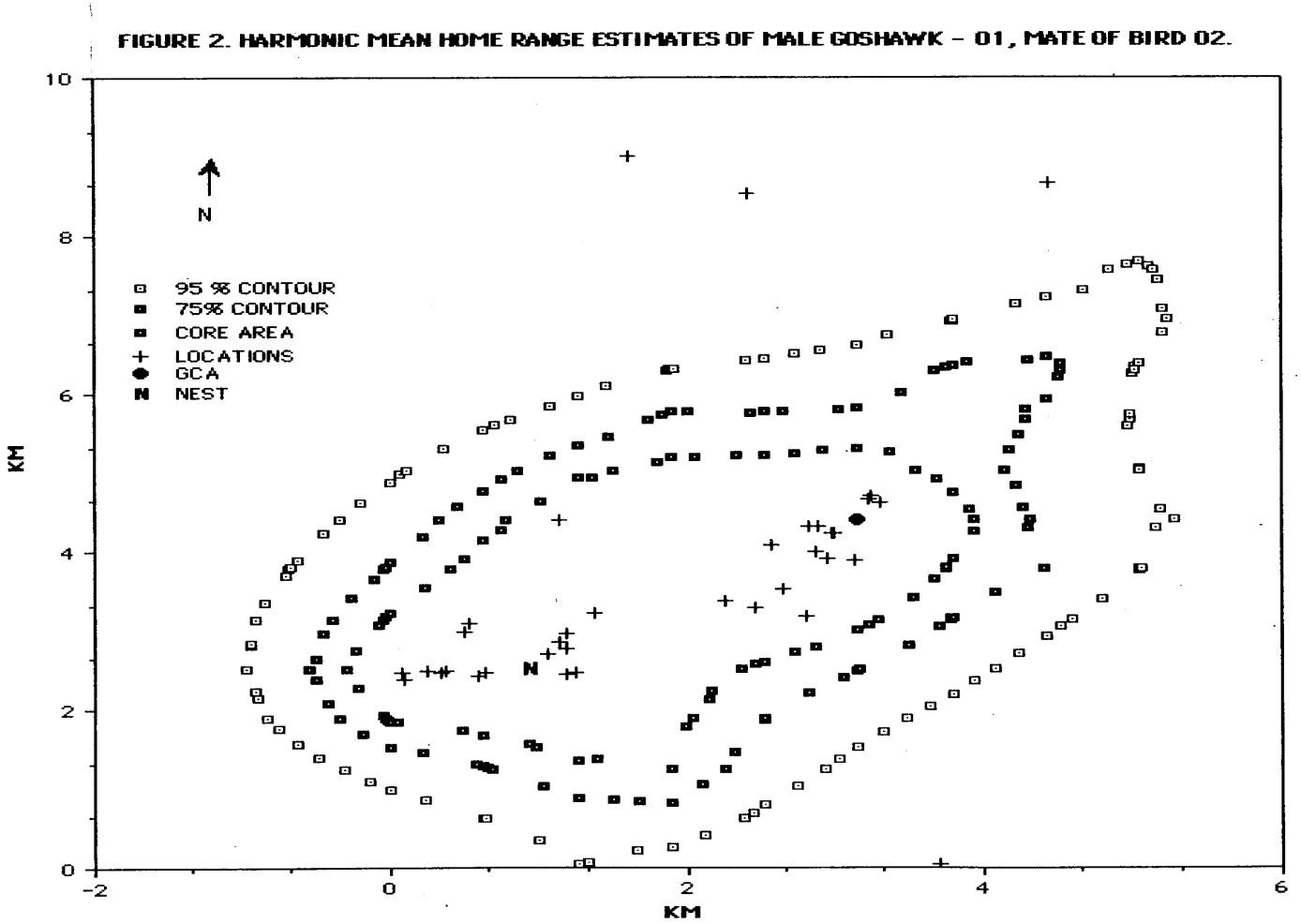

Fig. A5.2. Kennedy (1989) Fig. 2

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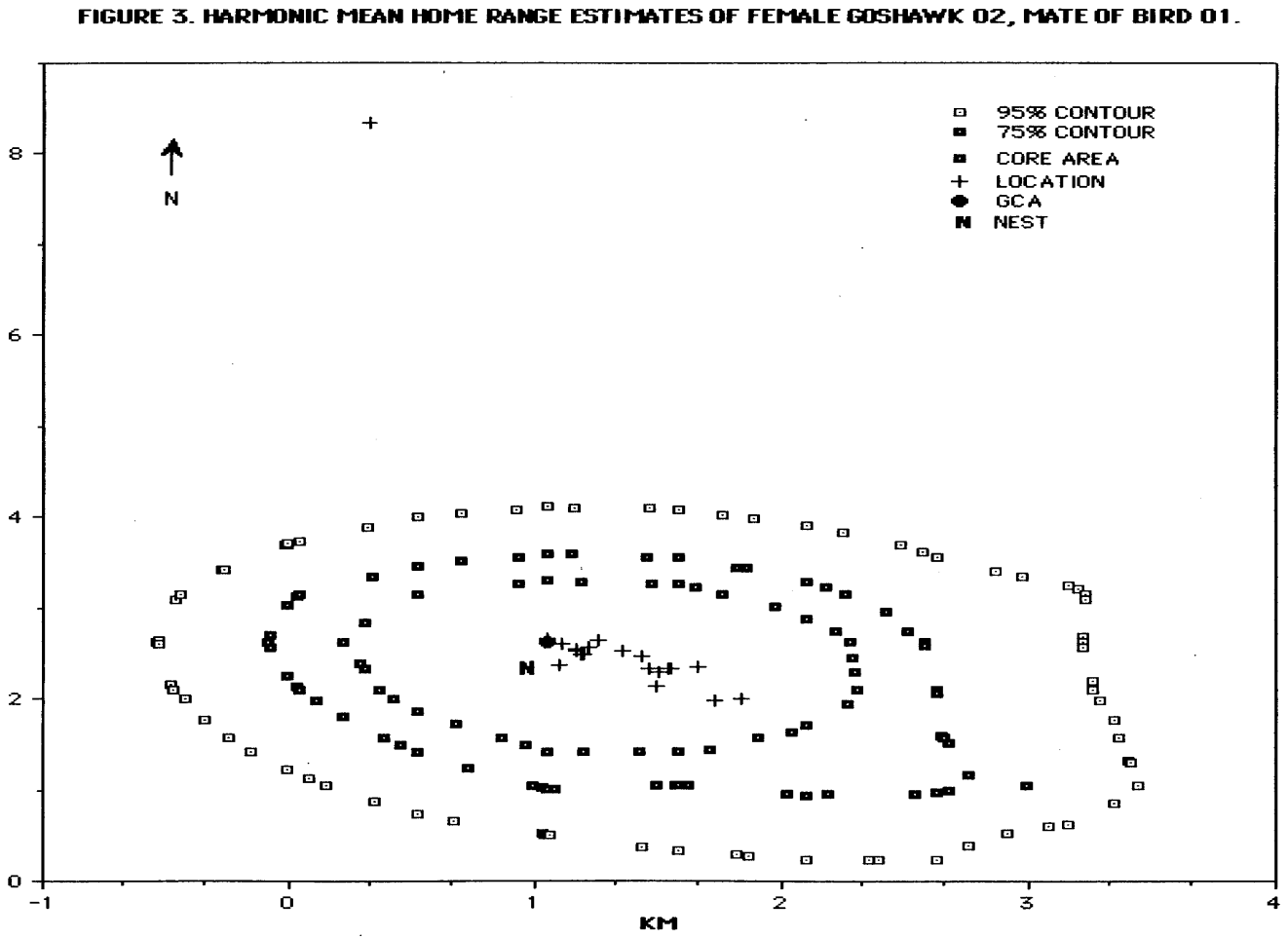

Fig. A5.3. Kennedy (1989) Fig. 3.

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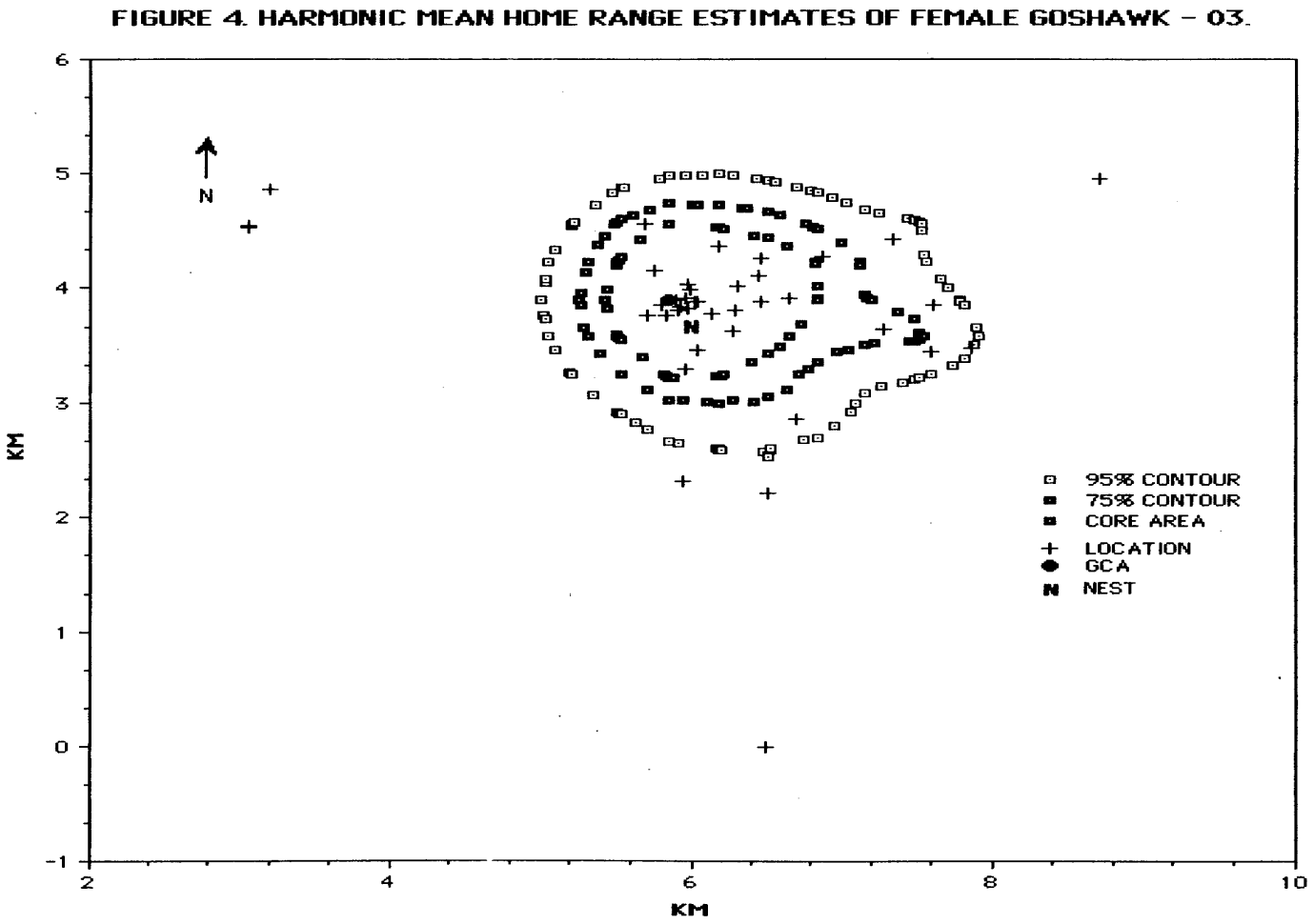

Fig. A5.4. Kennedy (1989) Fig. 4.

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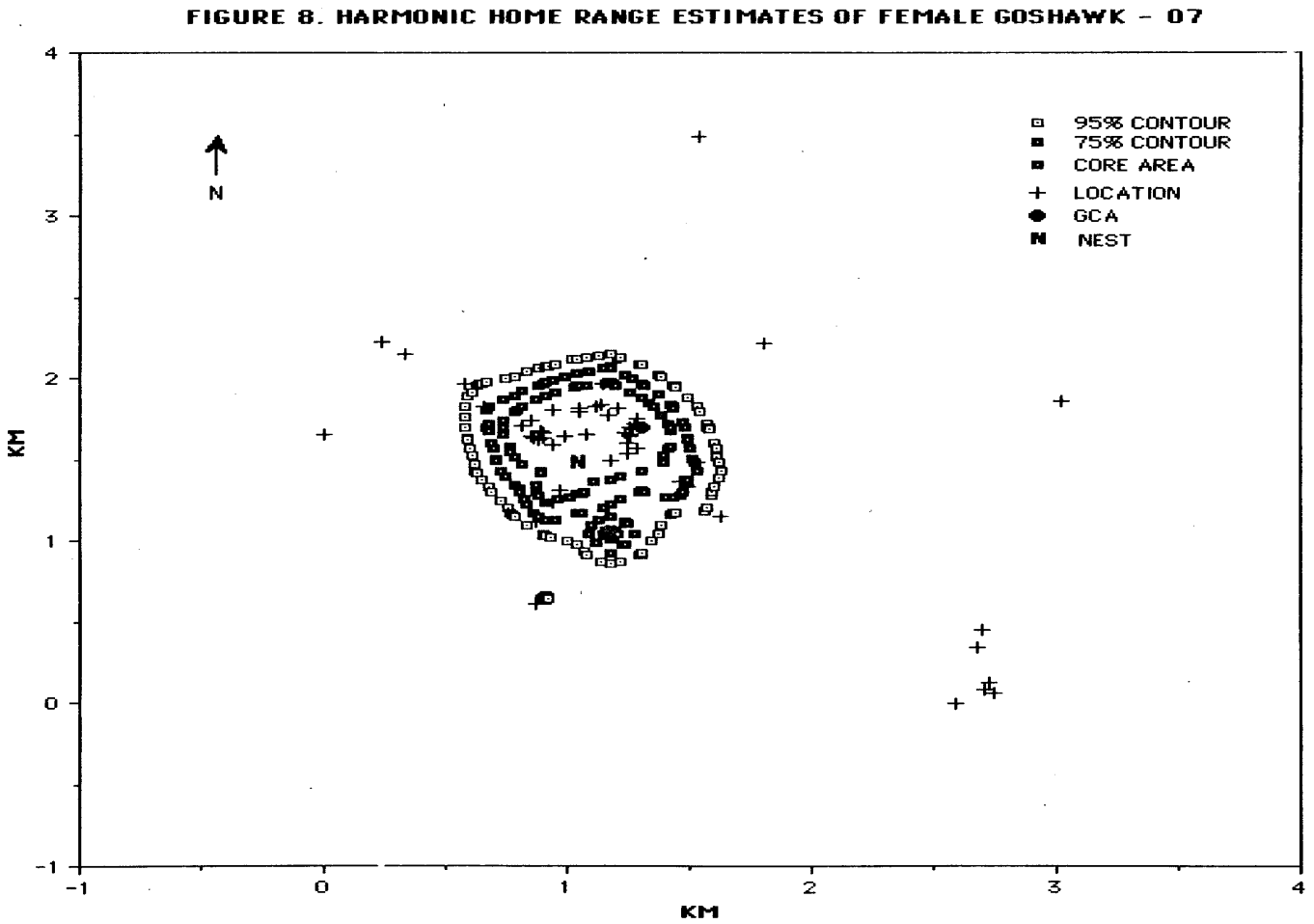

Fig. A5.8. Kennedy (1989) Fig. 8.

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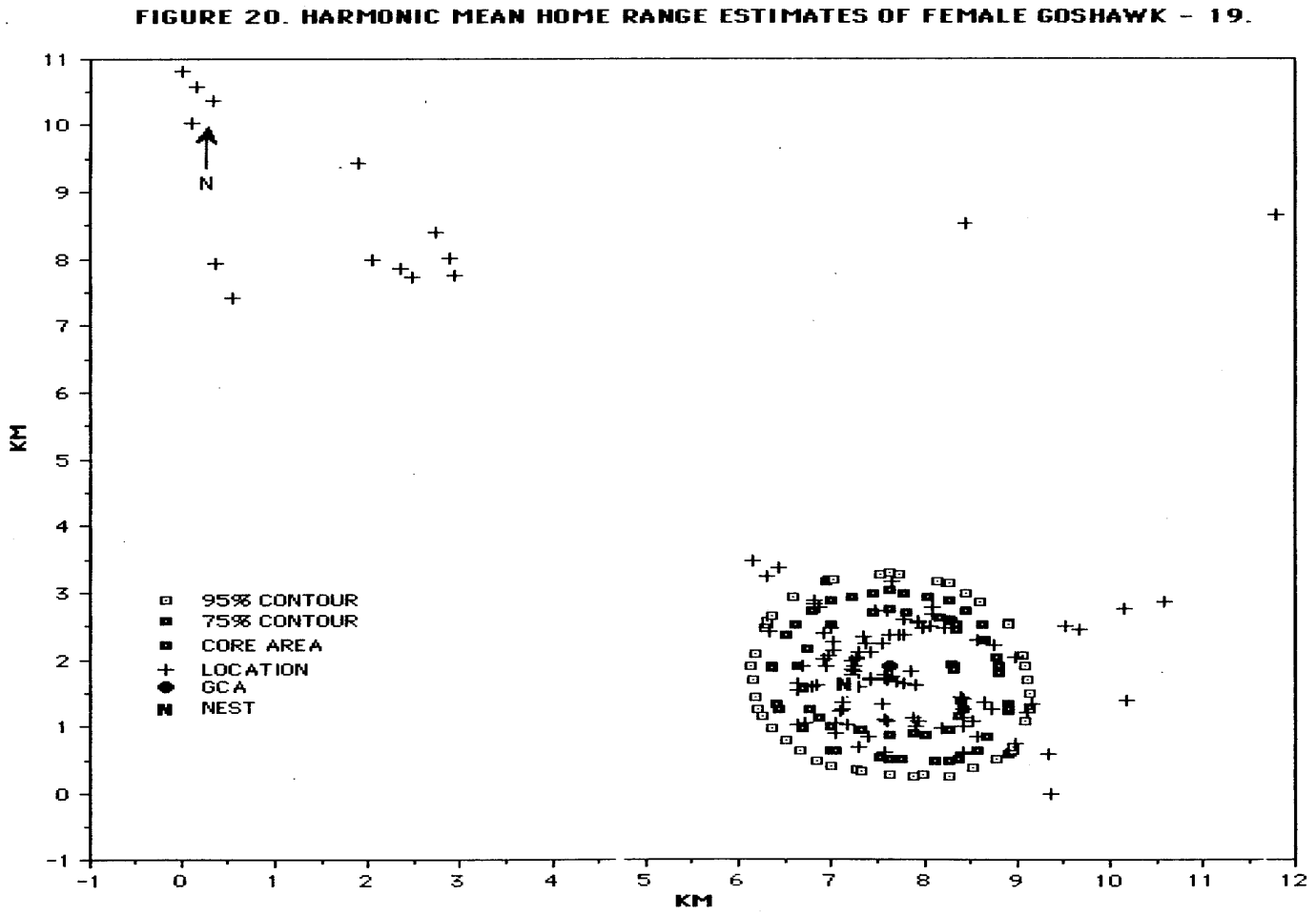

Fig. A5.20. Kennedy (1989) Fig. 20.

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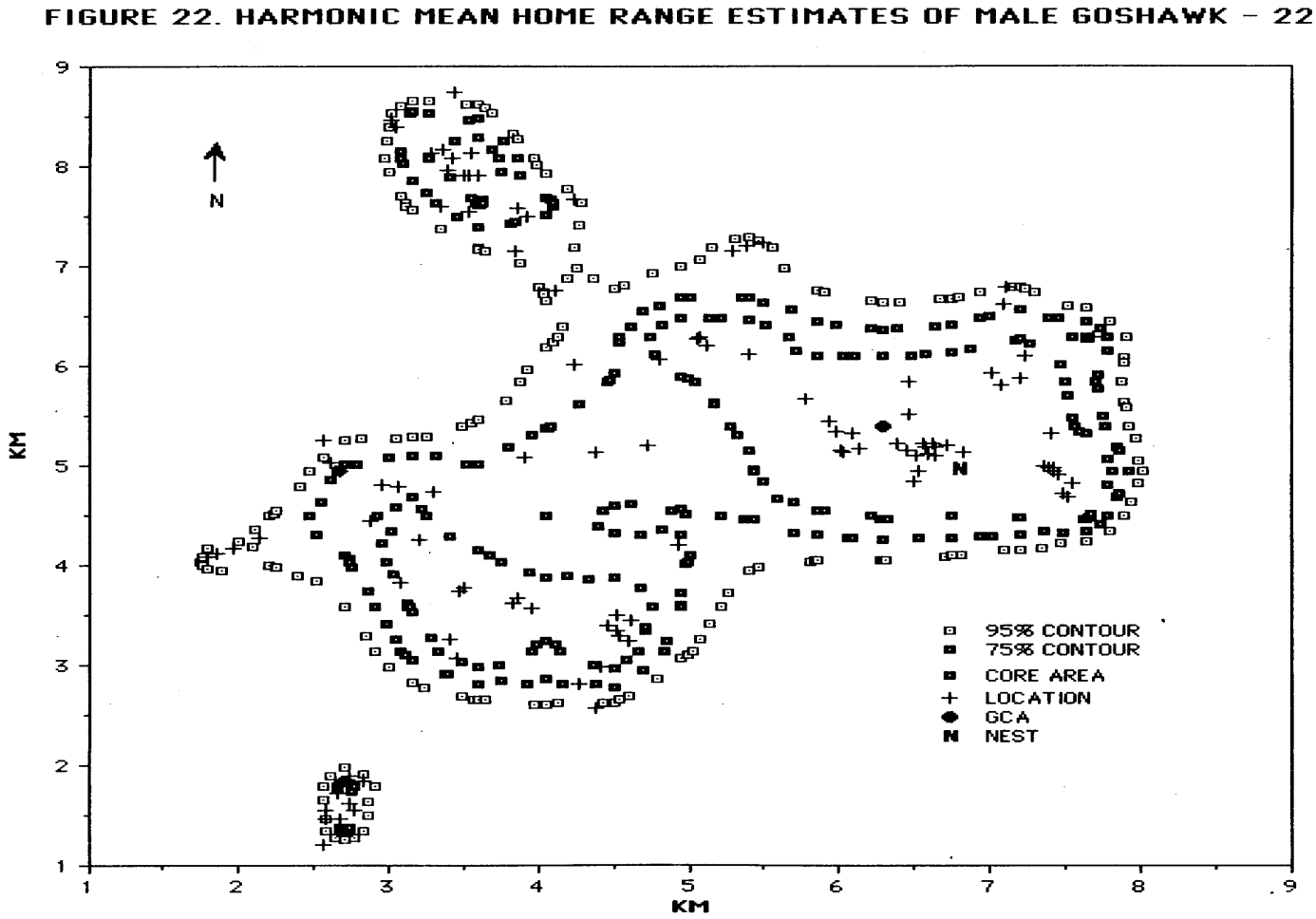

Fig. A5.22. Kennedy (1989) Fig. 22.

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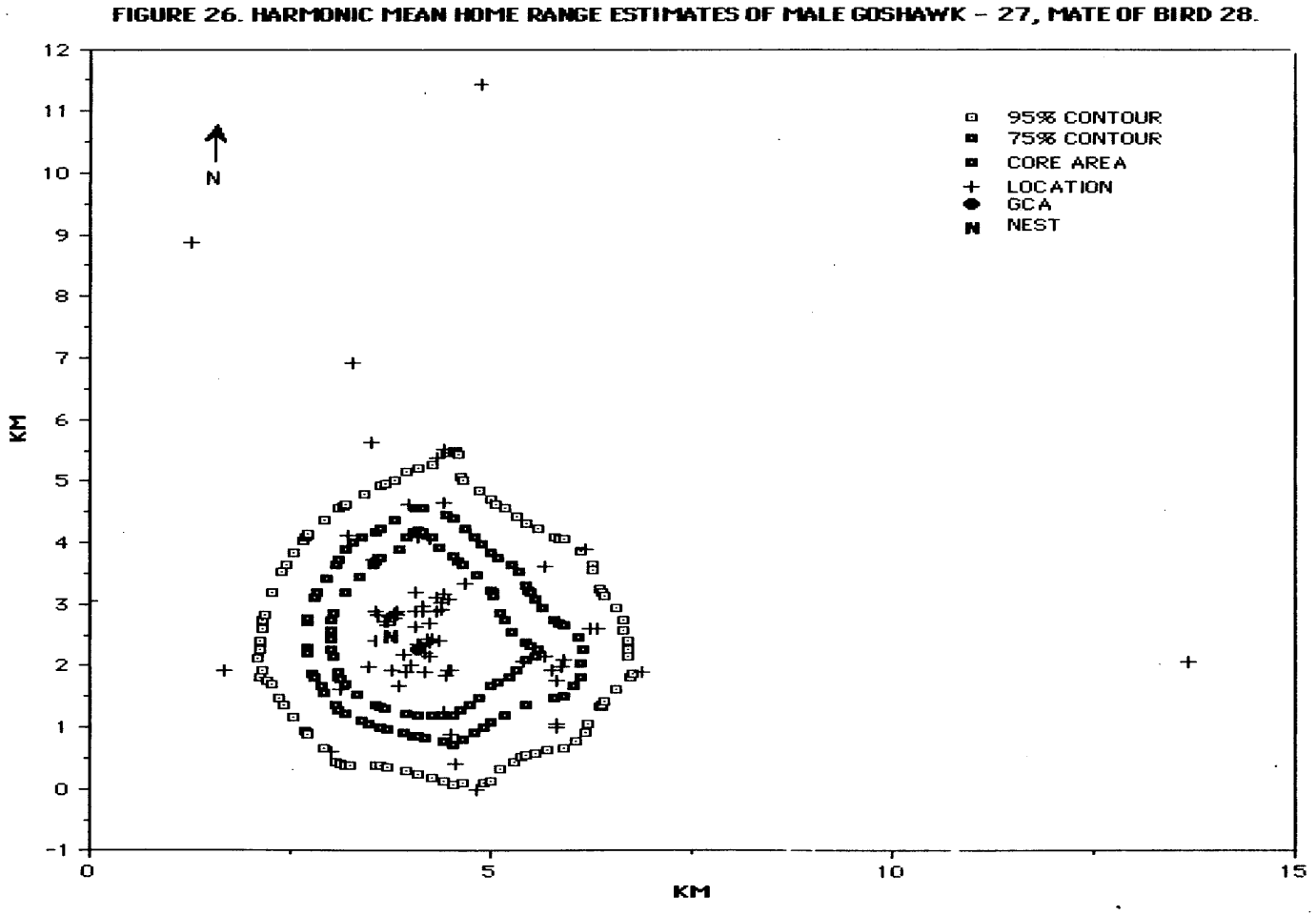

Fig. A5.26. Kennedy (1989) Fig. 26.

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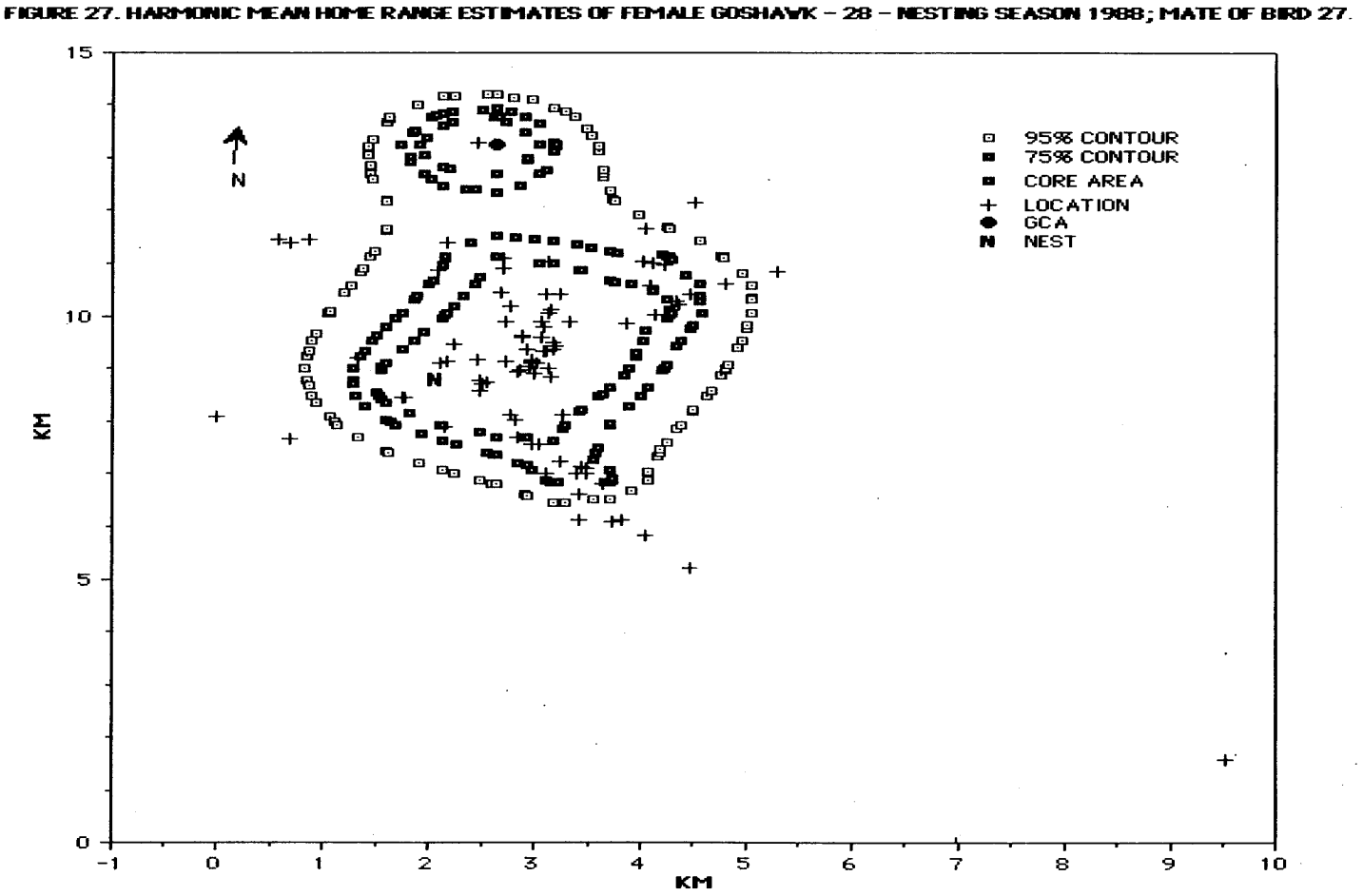

Fig. A5.27. Kennedy (1989) Fig. 27.

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Appendix 5. FDQA: Public Law 106-554 § 515

This petition is enabled under Section 515 of the Treasury and General Government Appropriations Act for Fiscal Year 2001 (Public Law 106-554; H.R. 5658), as implemented by Guidelines published in the Federal Register by the Office of Management and Budget (see Appendix 6).

In this petition, Public Law 106-554 § 515, the statutory directive requiring OMB development of data quality guidelines, is referred to as the Federal Data Quality Act, or FDQA, and is reproduced in full below:

Sec. 515.

(a) In General.--The Director of the Office of Management and Budget shall, by not later than September 30, 2001, and with public and Federal agency involvement, issue guidelines under sections 3504(d)(1)and 3516 of title 44, United States Code, that provide policy and procedural guidance to Federal agencies for ensuring and maximizing the quality, objectivity, utility, and integrity of information (including statistical information) disseminated by Federal agencies in fulfillment of the purposes and provisions of chapter 35 of title 44, United States Code, commonly referred to as the Paperwork Reduction Act.

(b) Content of Guidelines.--The guidelines under subsection (a) shall--

(1) apply to the sharing by Federal agencies of, and access to, information disseminated by Federal agencies; and

(2) require that each Federal agency to which the guidelines apply--

(A) issue guidelines ensuring and maximizing the quality, objectivity, utility, and integrity of information (including statistical information) disseminated by the agency, by not later than 1 year after the date of issuance of the guidelines under subsection (a);

(B) establish administrative mechanisms allowing affected persons to seek and obtain correction of information maintained and disseminated by the agency that does not comply with the guidelines issued under subsection (a); and

(C) report periodically to the Director--

(i) the number and nature of complaints received by the agency regarding the accuracy of information disseminated by the agency; and

(ii) how such complaints were handled by the agency.

Appendix 6. OMB Guidelines, Public Law 106-554 § 515

OMB Guidelines for Public Law 106-554 § 515 are reprinted below from

http://frwebgate6.access.gpo.gov/cgi-bin/waisgate.cgi?WAISdocID=170072204535+2+0+0&WAISaction=retrieve

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OMB Guidelines for Ensuring and Maximizing the Quality, Objectivity, Utility, and Integrity of Information Disseminated by Federal Agencies

[Federal Register: January 3, 2002 (Volume 2, Number 67)]
[Notices]
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From the Federal Register Online via GPO Access [wais.access.gpo.gov]
[DOCID:fr03ja02-99]

OFFICE OF MANAGEMENT AND BUDGET

Guidelines for Ensuring and Maximizing the Quality, Objectivity, Utility, and Integrity of Information Disseminated by Federal Agencies

AGENCY: Office of Management and Budget, Executive Office of the President.

ACTION: Final guidelines.

SUMMARY: These final guidelines implement section 515 of the Treasury and General Government Appropriations Act for Fiscal Year 2001 (Public Law 106-554; H.R. 5658). Section 515 directs the Office of Management and Budget (OMB) to issue government-wide guidelines that "provide policy and procedural guidance to Federal agencies for ensuring and maximizing the quality, objectivity, utility, and integrity of information (including statistical information) disseminated by Federal agencies." By October 1, 2002, agencies must issue their own implementing guidelines that include "administrative mechanisms allowing affected persons to seek and obtain correction of information maintained and disseminated by the agency" that does not comply with the OMB guidelines. These final guidelines also reflect the changes OMB made to the guidelines issued September 28, 2001, as a

result of receiving additional comment on the "capable of being substantially reproduced" standard (paragraphs V.3.B, V.9, and V.10), which OMB previously issued on September 28, 2001, on an interim final basis.

DATES: Effective Date: January 3, 2002.

FOR FURTHER INFORMATION CONTACT: Brooke J. Dickson, Office of Information and Regulatory Affairs, Office of Management and Budget, Washington, DC 20503. Telephone (202) 395-3785 or by e-mail to informationquality@omb.eop.gov.

SUPPLEMENTARY INFORMATION: In section 515(a) of the Treasury and General Government Appropriations Act for Fiscal Year 2001 (Public Law 106-554; H.R. 5658), Congress directed the Office of Management (OMB) to issue, by September 30, 2001, government-wide guidelines that "provide policy and procedural guidance to Federal agencies for ensuring and maximizing the quality, objectivity, utility, and integrity of information (including statistical information) disseminated by Federal agencies * * *" Section 515(b) goes on to state that the OMB guidelines shall:

"(1) apply to the sharing by Federal agencies of, and access to, information disseminated by Federal agencies; and

"(2) require that each Federal agency to which the guidelines apply--

"(A) issue guidelines ensuring and maximizing the quality, objectivity, utility, and integrity of information (including statistical information) disseminated by the agency, by not later than 1 year after the date of issuance of the guidelines under subsection (a);

"(B) establish administrative mechanisms allowing affected persons to seek and obtain correction of information maintained and disseminated by the agency that does not comply with the guidelines issued under subsection (a); and

"(C) report periodically to the Director--

"(i) the number and nature of complaints received by the agency regarding the accuracy of information disseminated by the agency and

"(ii) how such complaints were handled by the agency."

Proposed guidelines were published in the Federal Register on June 28, 2001 (66 FR 34489). Final guidelines were published in the Federal Register on September 28, 2001 (66 FR 49718). The Supplementary Information to the final guidelines published in September 20001 provides background, the underlying principles OMB followed in issuing the final guidelines, and statements of intent concerning detailed provisions in the final guidelines.

In the final guidelilnes published in September 2001, OMB also requested additional comment on the "capable of being substantially reproduced" standard and the related definition of "influential scientific or statistical information" (paragraphs

V.3.B, V.9, and V.10), which were issued on an interim final basis. The final guidelines published today discuss the public comments OMB received, the OMB response, and amendments to the final guidelines published in September 2001.

In developing agency-specific guidelines, agencies should refer both to the Supplementary Information to the final guidelines published in the Federal Register on September 28, 2001 (66 FR 49718), and also to the Supplementary Information published today. We stress that the three "Underlying Principles" that OMB followed in drafting the guidelines that we published on September 28, 2001 (66 FR 49719), are also applicable to the amended guidelines that we publish today.

In accordance with section 515, OMB has designed the guidelines to help agencies ensure and maximize the quality, utility, objectivity and integrity of the information that they disseminate (meaning to share with, or give access to, the public). It is crucial that information Federal agencies disseminate meets these guidelines. In this respect, the fact that the Internet enables agencies to communicate information quickly and easily to a wide audience not only offers great benefits to society, but also increases the potential harm that can result from the dissemination of information that does not meet basic information quality guidelines. Recognizing the wide variety of information Federal agencies disseminate and the wide variety of dissemination practices that agencies have, OMB developed the guidelines with several principles in mind.

First, OMB designed the guidelines to apply to a wide variety of government information dissemination activities that may range in importance and scope. OMB also designed the guidelines to be generic enough to fit all media, be they printed, electronic, or in other form. OMB sought to avoid the problems that would be inherent in developing detailed, prescriptive, "one-size-fits-all" government-wide guidelines that would artificially require different types of dissemination activities to be treated in the same manner. Through this flexibility, each agency will be able to incorporate the requirements of these OMB guidelines into the agency's own information resource management and administrative practices.

Second, OMB designed the guidelines so that agencies will meet basic information quality standards. Given the administrative mechanisms required by section 515 as well as the standards set forth in the Paperwork Reduction Act, it is clear that agencies should not disseminate substantive information that does not meet a basic level of quality. We recognize that some government information may need to meet higher or more specific information quality standards than those that would apply to other types of government information. The more important the information, the higher the quality standards to which it should be held, for example, in those situations involving "influential scientific, financial, or statistical information" (a phrase defined in these guidelines). The guidelines recognize, however, that information quality comes at a cost. Accordingly, the agencies should weigh the costs (for example, including costs attributable to agency processing effort, respondent burden, maintenance of needed privacy, and assurances of suitable confidentiality) and the benefits of higher information quality in the development of information, and the level of quality to which the information disseminated will be held.

Third, OMB designed the guidelines so that agencies can apply them in a common-sense and workable manner. It is important that these guidelines do not impose unnecessary administrative burdens that would inhibit agencies from continuing to take advantage of the Internet and other technologies to disseminate information that can be of great benefit and value to the public. In this regard, OMB

encourages agencies to incorporate the standards and procedures required these guidelines into their existing information resources management and administrative practices rather than create new and potentially duplicative or contradictory processes. The primary example of this is that the guidelines recognize that, in accordance with OMB Circular A- 130, agencies already have in place well-established information quality standards and administrative mechanisms that allow persons to seek and obtain correction of information that is maintained and disseminated by the agency. Under the OMB guidelines, agencies need only ensure that their own guidelines are consistent with these OMB guidelines, and then ensure that their administrative are consistent with these OMB guidelines, and then ensure that their administrative mechanisms satisfy the standards and procedural requirements in the new agency guidelines. Similarly, agencies may rely on their implementation of the Federal Government's computer security laws (formerly, the Computer Security Act, and now the computer security provisions of the Paperwork Reduction Act) to establish appropriate security safeguards for ensuring the "integrity" of the information that the agencies disseminate.

In addition, in response to concerns expressed by some of the agencies, we want to emphasize that OMB recognizes that Federal agencies provide a wide variety of data and information. Accordingly, OMB understands that the guidelines discussed below cannot be implemented in the same way by each agency. In some cases, for example, the data disseminated by an agency are not collected by that agency; rather, the information the agency must provide in a timely manner is compiled from a variety of sources that are constantly updated and revised and may be confidential. In such cases, while agencies' implementation of the guidelines may differ, the essence of the guidelines will apply. That is, these agencies must make their methods transparent by providing documentation, ensure quality by reviewing the underlying methods used in developing the data and consulting (as appropriate) with experts and users, and keep users informed about corrections and revisions.

Summary of OMB Guidelines

These guidelines apply to Federal agencies subject to the Paperwork Reduction Act (44 U.S.C. chapter 35). Agencies are directed to develop information resources management procedures for reviewing and substantiating (by documentation or other means selected by the agency) the quality (including the objectivity, utility, and integrity) of information before it is disseminated. In addition, agencies are to establish administrative mechanisms allowing affected persons to seek and obtain, where appropriate, correction of information disseminated by the agency that does not comply with the OMB or agency guidelines. Consistent with the underlying principles described above, these guidelines stress the importance of having agencies apply these standards and develop their administrative mechanisms so they can be implemented in a common sense and workable manner. Moreover, agencies must apply these standards flexibly, and in a manner appropriate to the nature and timeliness of the information to be disseminated, and incorporate them into existing agency information resources management and administrative practices.

Section 515 denotes four substantive terms regarding information disseminated by Federal agencies: quality, utility, objectivity, and integrity. It is not always clear how each substantive term relates--or how the four terms in aggregate relate--to the widely divergent types of information that agencies disseminate. The guidelines

provide definitions that attempt to establish a clear meaning so that both the agency and the public can readily judge whether a particular type of information to be disseminated does or does not meet these attributes.

In the guidelines, OMB defines "quality" as the encompassing term, of which "utility," "objectivity," and "integrity" are the constituents. "Utility" refers to the usefulness of the information to the intended users. "Objectivity" focuses on whether the disseminated information is being presented in an accurate, clear, complete, and unbiased manner, and as a matter of substance, is accurate, reliable, and unbiased. "Integrity" refers to security--the protection of information from unauthorized access or revision, to ensure that the information is not compromised through corruption or falsification. OMB modeled the definitions of "information," "government information," "information dissemination product," and "dissemination" on the longstanding definitions of those terms in OMB Circular A-130, but tailored them to fit into the context of these guidelines.

In addition, Section 515 imposes two reporting requirements on the agencies. The first report, to be promulgated no later than October 1, 2002, must provide the agency's information quality guidelines that describe administrative mechanisms allowing affected persons to seek and obtain, where appropriate, correction of disseminated information that does not comply with the OMB and agency guidelines. The second report is an annual fiscal report to OMB (to be first submitted on January 1, 2004) providing information (both quantitative and qualitative, where appropriate) on the number, nature, and resolution of complaints received by the agency regarding its perceived or confirmed failure to comply with these OMB and agency guidelines.

Public Comments and OMB Response

Applicability of Guidelines. Some comments raised concerns about the applicability of these guidelines, particularly in the context of scientific research conducted by Federally employed scientists or Federal grantees who publish and communicate their research findings in the same manner as their academic colleagues. OMB believes that information generated and disseminated in these contexts is not covered by these guidelines unless the agency represents the information as, or uses the information in support of, an official position of the agency.

As a general matter, these guidelines apply to "information" that is "disseminated" by agencies subject to the Paperwork Reduction Act (44 U.S.C. 3502(1)). See paragraphs II, V.5 and V.8. The definitions of "information" and "dissemination" establish the scope of the applicability of these guidelines. "Information" means "any communication or representation of knowledge such as facts or data * * *" This definition of information in paragraph V.5 does "not include opinions, where the agency's presentation makes it clear that what is being offered is someone's opinion rather than fact or the agency's views."

"Dissemination" is defined to mean "agency initiated or sponsored distribution of information to the public." As used in paragraph V.8, "agency INITIATED * * * distribution of information to the public" refers to information that the agency disseminates, e.g., a risk assessment prepared by the agency to inform the agency's formulation of possible regulatory or other action. In addition, if an agency, as an institution, disseminates information prepared by an outside party in a manner that reasonably suggests that the agency agrees with the information, this

appearance of having the information represent agency views makes agency dissemination of the information subject to these guidelines. By contrast, an agency does not "initiate" the dissemination of information when a Federally employed scientist or Federal grantee or contractor publishes and communicates his or her research findings in the same manner as his or her academic colleagues, even if the Federal agency retains ownership or other intellectual property rights because the Federal government paid for the research. To avoid confusion regarding whether the agency agrees with the information (and is therefore disseminating it through the employee or grantee), the researcher should include an appropriate disclaimer in the publication or speech to the effect that the "views are mine, and do not necessarily reflect the view" of the agency.

Similarly, as used in paragraph V.8., "agency * * * SPONSORED distribution of information to the public" refers to situations where an agency has directed a third-party to disseminate information, or where the agency has the authority to review and approve the information before release. Therefore, for example, if an agency through a procurement contract or a grant provides for a person to conduct research, and then the agency directs the person to disseminate the results (or the agency reviews and approves the results before they may be disseminated), then the agency has "sponsored" the dissemination of this information. By contrast, if the agency simply provides funding to support research, and it the researcher (not the agency) who decides whether to disseminate the results and--if the results are to be released--who determines the content and presentation of the dissemination, then the agency has not "sponsored" the dissemination even though it has funded the research and even if the Federal agency retains ownership or other intellectual property rights because the Federal government paid for the research. To avoid confusion regarding whether the agency is sponsoring the dissemination, the researcher should include an appropriate disclaimer in the publication or speech to the effect that the "views are mine, and do not necessarily reflect the view" of the agency. On the other hand, subsequent agency dissemination of such information requires that the information adhere to the agency's information quality guidelines. In sum, these guidelines govern an agency's dissemination of information, but generally do not govern a third-party's dissemination of information (the exception being where the agency is essentially using the third-party to disseminate information on the agency's behalf). Agencies, particularly those that fund scientific research, are encouraged to clarify the applicability of these guidelines to the various types of information they and their employees and grantees disseminate.

Paragraph V.8 also states that the definition of "dissemination" does not include "* * * distribution limited to correspondence with individuals or persons, press releases, archival records, public filings, subpoenas or adjudicative processes." The exemption from the definition of "dissemination" for "adjudicative processes" is intended to exclude, from the scope of these guidelines, the findings and determinations that an agency makes in the course of adjudications involving specific parties. There are well-established procedural safeguards and rights to address the quality of adjudicatory decisions and to provide persons with an opportunity to contest decisions. These guidelines do not impose any additional requirements on agencies during adjudicative proceedings and do not provide parties to such adjudicative proceedings any additional rights of challenge or appeal. The Presumption Favoring Peer-Reviewed Information. As a general matter, in the scientific and research context, we regard technical information that has been subjected to formal, independent, external peer review as presumptively objective.

As the guidelines state in paragraph V.3.b.i: "If data and analytic results have been subjected to formal, independent, external peer review, the information may generally be presumed to be of acceptable objectivity." An example of a formal, independent, external peer review is the review process used by scientific journals.

Most comments approved of the prominent role that peer review plays in the OMB guidelines. Some comments contended that peer review was not accepted as a universal standard that incorporates an established, practiced, and sufficient level of objectively. Other comments stated that the guidelines would be better clarified by making peer review one of several factors that an agency should consider in assessing the objectivity (and quality in general) of original research. In addition, several comments noted that peer review does not establish whether analytic results are capable of being substantially reproduced. In light of the comments, the final guidelines in new paragraph V.3.b.i qualify the presumption in favor of peer-reviewed information as follows:

"However, this presumption is rebuttable based on a persuasive showing by the petitioner in a particular instance."

We believe that transparency is important for peer review, and these guidelines set minimum standards for the transparency of agency- sponsored peer review. As we state in new paragraph V.3.b.i: "If data and analytic results have been subjected to formal, independent, external peer review, the information may generally be presumed to be of acceptable objectivity. However, this presumption is rebuttable based on a persuasive showing by the petitioner in particular instance. If agency-sponsored peer review is employed to help satisfy the objectively standard, the review process employed shall meet the general criteria for competent and credible peer review recommended by OMB-OIRA to the President's Management Council (9/20/01) (http://www.whitehouse.gov/omb/inforeg/oira_review-process.html), namely, `that (a) peer reviewers be selected primarily on the basis of necessary technical expertise, (b) peer reviewers be expected to disclosed to agencies prior technical/policy positions they may have taken on the issues at hand, (c) peer reviewers be expected to disclose to agencies their sources of personal and institutional funding (private or public sector), and (d) peer reviews be conducted in an open and rigorous manner.' "

The importance of these general criteria for competent and credible peer review has been supported by a number of expert bodies. For example. "the work of fully competent peer-review panels can be undermined by allegations of conflict of interest and bias. Therefore, the best interests of the Board are served by effective policies and procedures regarding potential conflicts of interest, impartiality, and panel balance." (EPA's Science Advisory Board Panels: Improved Policies and Procedures Needed to Ensure Independence and Balance, GAO- 01-536, General Accounting Office, Washington, DC, June 2001, page 19.) As another example, "risk analyses should be peer-reviewed and accessible--both physically and intellectually--so that decision-makers at all levels will be able to respond critically to risk characterizations. The intensity of the peer reviews should be commensurate with the significance of the risk or its management implications." (Setting Priorities, Getting Results: A New Direction for EPA, Summary Report, National Academy of Public Administration, Washington, DC, April 1995, page 23.)

These criteria for peer reviewers are generally consistent with the practices now followed by the National Research Council of the National Academy of Sciences. In

considering these criteria for peer reviewers, we note that there are many types of peer reviews and that agency guidelines concerning the use of peer review should tailor the rigor of peer review to the importance of the information involved. More generally, agencies should define their peer-review standards in appropriate ways, given the nature and importance of the information they disseminate.

Is Journal Peer Review Always Sufficient? Some comments argued that journal peer review should be adequate to demonstrate quality, even for influential information that can be expected to have major effects or public policy. OMB believes that this position overstates the effectiveness of journal peer review as a quality-control mechanism.

Although journal peer review is clearly valuable, there are cases where flawed science has been published in respected journals. For example, the NIH Office of Research Integrity recently reported the following case regarding environmental health research:

"Based on the report of an investigation conducted by [XX] University, dated July 16, 1999, and additional analysis conducted by ORI in its oversight review, the US Public Health Service found that Dr. [X] engaged in scientific misconduct. Dr. [X] committed scientific misconduct by intentionally falsifying the research results published in the journal SCIENCE and by providing falsified and fabricated materials to investigating officials at [XX] University in response to a request for original data to support the research results and conclusions report in the SCIENCE paper. In addition, PHS finds that there is no original data or other corroborating evidence to support the research results and conclusions reported in the SCIENCE paper as whole." (66 FR 52137, October 12, 2001).

Although such cases of falsification are presumably rare, there is a significance scholarly literature documenting quality problems with articles published in peer-reviewed research. "In a [peer-reviewed] meta-analysis that surprised many--and some doubt--researchers found little evidence that peer review actually improves the quality of research papers." (See, e.g., Science, Vol. 293, page 2187 (September 21, 2001.)) In part for this reason, many agencies have already adopted peer review and science advisory practices that go beyond journal peer review. See, e.g., Sheila Jasanoff, The Fifth Branch: Science Advisers as Policy Makers, Cambridge, MA, Harvard University Press, 1990; Mark R. Powell, Science at EPA: Information in the Regulatory Process. Resources for the Future, Washington, DC., 1999, pages 138-139; 151- 153; Implementation of the Environmental Protection Agency's Peer Review Program: An SAB Evaluation of Three Reviews, EPA-SAB-RSAC-01- 009, A Review of the Research Strategies Advisory Committee (RSAC) of the EPA Science Advisory Board (SAB), Washington, DC., September 26, 2001. For information likely to have an important public policy or private sector impact, OMB believes that additional quality checks beyond peer review are appropriate.

Definition of "Influential". OMB guidelines apply stricter quality standards to the dissemination of information that is considered "influential." Comments noted that the breadth of the definition of "influential" in interim final paragraph V.9 requires much speculation on the part of agencies.

We believe that this criticism has merit and have therefore narrowed the definition. In this narrower definition, "influential", when used in the phrase "influential scientific, financial, or statistical information", is amended to mean that

"the agency can reasonably determine that dissemination of the information will have or does have a clear and substantial impact on important public policies or important private sector decisions." The intent of the new phrase "clear and substantial" is to reduce the need for speculation on the part of agencies. We added the present tense--"or does have"--to this narrower definition because on occasion, an information dissemination may occur simultaneously with a particular policy change. In response to a public comment, we added an explicit reference to "financial" information as consistent with our original intent.

Given the differences in the many Federal agencies covered by these guidelines, and the differences in the nature of the information they disseminate, we also believe it will be helpful if agencies elaborate on this definition of "influential" in the context of their missions and duties, with due consideration of the nature of the information they disseminate. As we state in amended paragraph V.9, "Each agency is authorized to define `influential' in ways appropriate for it given the nature and multiplicity of issues for which the agency is responsible."

Reproducibility. As we state in new paragraph V.3.b.ii: "If an agency is responsible for disseminating influential scientific, financial, or statistical information, agency guidelines shall include a high degree of transparency about data and methods to facilitate the reproducibility of such information by qualified third parties." OMB believes that a reproducibility standard is practical and appropriate for information that is considered "influential", as defined in paragraph V.9--that "will have or does have a clear and substantial impact on important public policies or important private sector decisions." The reproducibility standard applicable to influential scientific, financial, or statistical information is intended to ensure that information disseminated by agencies is sufficiently transparent in terms of data and methods of analysis that it would be feasible for a replication to be conducted. The fact that the use of original and supporting data and analytic results have been deemed "defensible" by peer-review procedures does not necessarily imply that the results are transparent and replicable.

Reproducibility of Original and Supporting Data. Several of the comments objected to the exclusion of original and supporting data from the reproducibility requirements. Comments instead suggested that OMB should apply the reproducibility standard to original data, and that OMB should provide flexibility to the agencies in determining what constitutes "original and supporting" data. OMB agrees and asks that agencies consider, in developing their own guidelines, which categories of original and supporting data should be subject to the reproducibility standard and which should not. To help in resolving this issue, we also ask agencies to consult directly with relevant scientific and technical communities on the feasibility of having the selected categories of original and supporting data subject to the reproducibility standard. Agencies are encouraged to address ethical, feasibility, and confidentiality issues with care. As we state in new paragraph V.3.b.ii.A, "Agencies may identify, in consultation with the relevant scientific and technical communities, those particular types of data that can practicably be subjected to a reproducibility requirement, given ethical, feasibility, or confidentiality constraints." Further, as we state in our expanded definition of "reproducibility" in paragraph V.10, "If agencies apply the reproducibility test to specific types of original or supporting data, the associated guidelines shall provide relevant definitions of reproducibility (e.g. standards for replication of laboratory data)." OMB urges caution in the treatment of

original and supporting data because it may often be impractical or even impermissible or unethical to apply the reproducibility standard to such data. For example, it may not be ethical to repeat a "negative" (ineffective) clinical (therapeutic) experiment and it may not be feasible to replicate the radiation exposures studied after the Chernobyl accident. When agencies submit their draft agency guidelines for OMB review, agencies should include a description of the extent to which the reproducibility standard is applicable and reflect consultations with relevant scientific and technical communities that were used in developing guidelines related to applicability of the reproducibility standard to original and supporting data.

It is also important to emphasize that the reproducibility standard does not apply to all original and supporting data disseminated by agencies. As we state in new paragraph V.3.b.ii.A, "With regard to original and supporting data related [to influential scientific, financial, or statistical information], agency guidelines shall not require that all disseminated data be subjected to a reproducibility requirement." In addition, we encourage agencies to address how greater transparency can be achieved regarding original and supporting data. As we also state in new paragraph V.3.b.ii.A, "It is understood that reproducibility of data is an indication of transparency about research design and methods and thus a replication exercise (i.e., a new experiment, test, or sample) shall not be required prior to each dissemination." Agency guidelines need to achieve a high degree of transparency about data even when reproducibility is not required.

Reproducibility of Analytic Results. Many public comments were critical of the reproducibility standard and expressed concern that agencies would be required to reproduce each analytical result before it is disseminated. While several comments commended OMB for establishing an appropriate balance in the "capable of being substantially reproduced" standard, others considered this standard to be inherently subjective. There were also comments that suggested the standard would cause more burden for agencies.

It is no OMB's intent that each agency must reproduce each analytic result before it is disseminated. The purpose of the reproducibility standard is to cultivate a consistent agency commitment to transparency about how analytic results are generated: the specific data used, the various assumptions employed, the specific analytical methods applied, and the statistical procedures employed. If sufficient transparency is achieved on each of these matters, then an analytic result should meet the "capable of being substantially reproduced" standard.

While there is much variation in types of analytic results, OMB believes that reproducibility is a practical standard to apply to most types of analytic results. As we state in new paragraph V.3.b.ii.B, "With regard to analytic results related [to influential scientific, financial, or statistical information], agency guidelines shall generally require sufficient transparency about data and methods that an independent reanalysis could be undertaken by a qualified member of the public. These transparency standards apply to agency analysis of data from a single study as well as to analyses that combine information from multiple studies." We elaborate upon this principle in our expanded definition of "reproducibility" in paragraph V.10: "With respect to analytic results, `capable of being substantially reproduced' means that independent analysis of the original or supporting data using identical methods would generate similar analytic results, subject to an acceptable degree of imprecision or error."

Even in a situation where the original and supporting data are protected by confidentiality concerns, or the analytic computer models or other research methods may be kept confidential to protect intellectual property, it may still be feasible to have the analytic results subject to the reproducibility standard. For example, a qualified party, operating under the same confidentiality protections as the original analysts, may be asked to use the same data, computer model or statistical methods to replicate the analytic results reported in the original study. See, e.g., "Reanalysis of the Harvard Six Cities Study and the American Cancer Society Study of Particulate Air Pollution and Mortality," A Special Report of the Health Effects Institute's Particle Epidemiology Reanalysis Project, Cambridge, MA, 2000.

The primary benefit of public transparency is not necessarily that errors in analytic results will be detected, although error correction is clearly valuable. The more important benefit of transparency is that the public will be able to assess how much an agency's analytic result hinges on the specific analytic choices made by the agency. Concreteness about analytic choices allows, for example, the implications of alternative technical choices to be readily assessed. This type of sensitivity analysis is widely regarded as an essential feature of high-quality analysis, yet sensitivity analysis cannot be undertaken by outside parties unless a high degree of transparency is achieved. The OMB guidelines do not compel such sensitivity analysis as a necessary dimension of quality, but the transparency achieved by reproducibility will allow the public to undertake sensitivity studies of interest.

We acknowledge that confidentiality concerns will sometimes preclude public access as an approach to reproducibility. In response to public comment, we have clarified that such concerns do include interests in "intellectual property." To ensure that the OMB guidelines have sufficient flexibility with regard to analytic transparency, OMB has, in new paragraph V.3.b.ii.B.i, provided agencies an alternative approach for classes or types of analytic results that cannot practically be subject to the reproducibility standard. "[In those situations involving influential scientific, financial, or statistical information * * *] making the data and methods publicly available will assist in determining whether analytic results are reproducible. However, the objectivity standard does not override other compelling interests such as privacy, trade secrets, intellectual property, and other confidentiality protections. " Specifically, in cases where reproducibility will not occur due to other compelling interests, we expect agencies (1) to perform robustness checks appropriate to the importance of the information involved, e.g., determining whether a specific statistic is sensitive to the choice of analytic method, and, accompanying the information disseminated, to document their efforts to assure the needed robustness in information quality, and (2) address in their guidelines the degree to which they anticipate the opportunity for reproducibility to be limited by the confidentiality of underlying data. As we state in new paragraph V.3.b.ii.B.ii, "In situations where public access to date and methods will not occur due to other compelling interests, agencies shall apply especially rigorous robustness checks to analytic results and document what checks were undertaken. Agency guidelines shall, however, in all cases, require a disclosure of the specific data sources that have been used and the specific quantitative methods and assumptions that have been employed."

Given the differences in the many Federal agencies covered by these guidelines, and the differences in robustness checks and the level of detail for documentation thereof that might be appropriate for different agencies, we also believe it will helpful if agencies elaborate on these matters in the context of their missions and duties,

with due consideration of the nature of the information they disseminate. As we state in new paragraph V.3.b.ii.B.ii, "Each agency is authorized to define the type of robustness checks, and the level of detail for documentation thereof, in ways appropriate for it given the nature and multiplicity of issues for which the agency is responsible."

We leave the determination of the appropriate degree of rigor to the discretion of agencies and the relevant scientific and technical communities that work with the agencies. We do, however, establish a general standard for the appropriate degree of rigor in our expanded definition of "reproducibility" in paragraph V.10: " `Reproducibility' means that the information is capable of being substantially reproduced, subject to an acceptable degree of imprecision. For information judged to have more (less) important impacts, the degree of imprecision that is tolerated is reduced (increased)." OMB will review each agency's treatment of this issue when reviewing the agency guidelines as a whole.

Commercial also expressed concerns regarding interim final paragraph V.3.B.iii, "making the data and models publicly available will assist in determining whether analytic results are capable of being substantially reproduced," and whether it could be interpreted to constitute public dissemination of these materials, rendering moot the reproducibility test. (For the equivalent provision, see new paragraph V.3.b.ii.B.i.) The OMB guidelines do not require agencies to reproduce each disseminated analytic result by independent reanalysis. Thus, public dissemination of data and models per se does not mean that the analytic result has been reproduced. It means only that the result should be CAPABLE of being reproduced. The transparency associated with this capability of reproduction is what the OMB guidelines are designed to achieve.

We also want to build on a general observation that we made in our final guidelines published in September 2001. In those guidelines we stated: "... in those situations involving influential scientific[, financial,] or statistical information, the substantial reproducibility standard is added as a quality standard above and beyond some peer review quality standards" (66 FR 49722 (September 28, 2001)). A hypothetical example may serve to illustrate this point. Assume that two Federal agencies initiated or sponsored the dissemination of five scientific studies after October 1, 2002 (see paragraph III.4) that were, before dissemination, subjected to formal, independent, external peer review, i.e., that met the presumptive standard for "objectivity" under paragraph V.3.b.i. Further assume, at the time of dissemination, that neither agency reasonably expected that the dissemination of any of these studies would have "a clear and substantial impact" on important public policies, i.e., that these studies were not considered "influential" under paragraph V.9, and thus not subject to the reproducibility standards in paragraphs V.3.b.ii.A or B. Then assume, two years later, in 2005, that one of the agencies decides to issue an important and far-reaching regulation based clearly and substantially on the agency's evaluation of the analytic results set forth in these five studies and that such agency reliance on these five studies as published in the agency's notice of proposed rulemaking would constitute dissemination of these five studies. These guidelines would require the rulemaking agency, prior to publishing the notice of proposed rulemaking, to evaluate these five studies to determine if the analytic results stated therein would meet the "capable of being substantially reproduced" standards in paragraph V.3.b.ii.B and, if necessary, related standards governing original and supporting data in paragraph V.3.b.ii.A. If the agency were to decide that any of the five studies would not meet the reproducibility standard, the agency

may still rely on them but only if they satisfy the transparency standard and--as applicable--the disclosure of robustness checks required by these guidelines. Otherwise, the agency should not disseminate any of the studies that did not meet the applicable standards in the guidelines at the time it publishes the notice of proposed rulemaking.

Some comments suggested that OMB consider replacing the reproducibility standard with a standard concerning "confirmation" of results for influential scientific and statistical information. Although we encourage agencies to consider "confirmation" as a relevant standard--at least in some cases--for assessing the objectivity of original and supporting data, we believe that "confirmation" is too stringent a standard to apply to analytic results. Often the regulatory impact analysis prepared by an agency for a major rule, for example, will be the only formal analysis of an important subject. It would be unlikely that the results of the regulatory impact analysis had already been confirmed by other analyses. The "capable of being substantially reproduced" standard is less stringent than a "confirmation" standard because it simply requires that an agency's analysis be sufficiently transparent that another qualified party could replicate it through reanalysis.

Health, Safety, and Environmental Information. We note, in the scientific context, that in 1996 the Congress, for health decisions under the Safe Drinking Water Act, adopted a basic standard of quality for the use of science in agency decisionmaking. Under 42 U.S.C. 300g- 1(b)(3)(A), an agency is directed, "to the degree that an Agency action is based on science," to use "(i) the best available, peer- reviewed science and supporting studies conducted in accordance with sound and objective scientific practices; and (ii) data collected by accepted methods or best available methods (if the reliability of the method and the nature of the decision justifies use of the data)."

We further note that in the 1996 amendments to the Safe Drinking Water Act, Congress adopted a basic quality standard for the dissemination of public information about risks of adverse health effects. Under 42 U.S.C. 300g-1(b)(3)(B), the agency is directed, "to ensure that the presentation of information [risk] effects is comprehensive, informative, and understandable." The agency is further directed, "in a document made available to the public in support of a regulation [to] specify, to the extent practicable--(i) each population addressed by any estimate [of applicable risk effects]; (ii) the expected risk or central estimate of risk for the specific populations [affected]; (iii) each appropriate upper-bound or lower-bound estimate of risk; (iv) each significant uncertainty identified in the process of the assessment of [risk] effects and the studies that would assist in resolving the uncertainty; and (v) peer-reviewed studies known to the [agency] that support, are directly relevant to, or fail to support any estimate of [risk] effects and the methodology used to reconcile inconsistencies in the scientific data."

As suggested in several comments, we have included these congressional standards directly in new paragraph V.3.b.ii.C, and made them applicable to the information disseminated by all the agencies subject to these guidelines: "With regard to analysis of risks to human health, safety and the environment maintained or disseminated by the agencies, agencies shall either adopt or adapt the quality principles applied by Congress to risk information used and disseminated pursuant to the Safe Drinking Water Act Amendments of 1996 (42 U.S.C. 300g-1(b)(3)(A) & (B))." The word "adapt" is intended to provide agencies flexibility in applying these principles to various types of risk assessment.

Comments also argued that the continued flow of vital information from agencies responsible for disseminating health and medical information to medical providers, patients, and the public may be disrupted due to these peer review and reproducibility standards. OMB responded by adding to new paragraph V.3.ii.C: "Agencies responsible for dissemination of vital health and medical information shall interpret the reproducibility and peer-review standards in a manner appropriate to assuring the timely flow of vital information from agencies to medical providers, patients, health agencies, and the public. Information quality standards may be waived temporarily by agencies under urgent situations (e.g., imminent threats to public health or homeland security) in accordance with the latitude specified in agency-specific guidelines."

Administrative Correction Mechanisms. In addition to commenting on the substantive standards in these guidelines, many of the comments noted that the OMB guidelines on the administrative correction of information do not specify a time period in which the agency investigation and response must be made. OMB has added the following new paragraph III.3.i to direct agencies to specify appropriate time periods in which the investigation and response need to be made. "Agencies shall specify appropriate time periods for agency decisions on whether and how to correct the information, and agencies shall notify the affected persons of the corrections made."

Several comments stated that the OMB guidelines needed to direct agencies to consider incorporating an administrative appeal process into their administrative mechanisms for the correction of information. OMB agreed, and added the following new paragraph III.3.ii: "If the person who requested the correction does not agree with the agency's decision (including the corrective action, if any), the person may file for reconsideration within the agency. The agency shall establish an administrative appeal process to review the agency's initial decision, and specify appropriate time limits in which to resolve such requests for reconsideration." Recognizing that many agencies already have a process in place to respond to public concerns, it is not necessarily OMB's intent to require these agencies to establish a new or different process. Rather, our intent is to ensure that agency guidelines specify an objective administrative appeal process that, upon further complaint by the affected person, reviews an agency's decision to disagree with the correction request. An objective process will ensure that the office that originally disseminates the information does not have responsibility for both the initial response and resolution of a disagreement. In addition, the agency guidelines should specify that if the agency believes other agencies may have an interest in the resolution of any administrative appeal, the agency should consult with those other agencies about their possible interest.

Overall, OMB does not envision administrative mechanisms that would burden agencies with frivolous claims. Instead, the correction process should serve to address the genuine and valid needs of the agency and its constituents without disrupting agency processes. Agencies, in making their determination of whether or not to correct information, may reject claims made in bad faith or without justification, and are required to undertake only the degree of correction that they conclude is appropriate for the nature and timeliness of the information involved, and explain such practices in their annual fiscal year reports to OMB.

OMS's issuance of these final guidelines is the beginning of an evolutionary process that will include draft agency guidelines, public comment, final agency

guidelines, development of experience with OMB and agency guidelines, and continued refinement of both OMB and agency guidelines. Just as OMB requested public comment before issuing these final guidelines, OMB will refine these guidelines as experience develops and further public comment is obtained.

Dated: December 21, 2001.
John D. Graham,
Administrator, Office of Information and Regulatory Affairs.

Guidelines for Ensuring and Maximizing the Quality, Objectivity, Utility, and Integrity of Information Disseminated by Federal Agencies

I. OMB Responsibilities

Section 515 of the Treasury and General Government Appropriations Act for FY2001 (Public Law 106-554) directs the Office of Management and Budget to issue government-wide guidelines that provide policy and procedural guidance to Federal agencies for ensuring and maximizing the quality, objectivity, utility, and integrity of information, including statistical information, disseminated by Federal agencies.

II. Agency Responsibilities

Section 515 directs agencies subject to the Paperwork Reduction Act (44 U.S.C. 3502(1)) to--

1. Issue their own information quality guidelines ensuring and maximizing the quality, objectivity, utility, and integrity of information, including statistical information, disseminated by the agency no later than one year after the date of issuance of the OMB guidelines;

2. Establish administrative mechanisms allowing affected persons to seek and obtain correction of information maintained and disseminated by the agency that does not comply with these OMB guidelines; and

3. Report to the Director of OMB the number and nature of complaints received by the agency regarding agency compliance with these OMB guidelines concerning the quality, objectivity, utility, and integrity of information and how such complaints were resolved.

III. Guidelines for Ensuring and Maximizing the Quality, Objectivity, Utility, and Integrity of Information Disseminated by Federal Agencies

1. Overall, agencies shall adopt a basic standard of quality (including objectivity, utility, and integrity) as a performance goal and should take appropriate steps to incorporate information quality criteria into agency information dissemination practices. Quality is to be ensured and established at levels appropriate to the nature and timeliness of the information to be disseminated. Agencies shall adopt specific standards of quality that are appropriate for the various categories of information they disseminate.

2. As a matter of good and effective agency information resources management, agencies shall develop a process for reviewing the quality (including the objectivity, utility, and integrity) of information before it is disseminated. Agencies shall treat information quality as integral to every step of an agency's development of information, including creation, collection, maintenance, and dissemination. This process shall enable the agency to substantiate the quality of the information it has disseminated through documentation or other means appropriate to the information.

3. To facilitate public review, agencies shall establish administrative mechanisms allowing affected persons to seek and obtain, where appropriate, timely correction of information maintained and disseminated by the agency that does not comply with OMB or agency guidelines. These administrative mechanisms shall be flexible, appropriate to the nature and timeliness of the disseminated information, and incorporated into agency information resources management and administrative practices.

i. Agencies shall specify appropriate time periods for agency decisions on whether and how to correct the information, and agencies shall notify the affected persons of the corrections made.

ii. If the person who requested the correction does not agree with the agency's decision (including the corrective action, if any), the person may filed for reconsideration within the agency. The agency shall establish an administrative appeal process to review the agency's initial decision, and specify appropriate time limits in which to resolve such requests for reconsideration.

4. The Agency's pre-dissemination review, under paragraph III.2, shall apply to information that the agency first disseminates on or after October 1, 2002. The agency's administrative's mechanisms, under paragraph III.3., shall apply to information that the agency disseminates on or after October 1, 2001, regardless of when the agency first disseminated the information.

IV. Agency Reporting Requirements

1. Agencies must designate the Chief Information Officer or another official to be responsible for agency compliance with these guidelines.

2. The agency shall respond to complaints in a manner appropriate to the nature and extent of the complaint. Examples of appropriate responses include personal contacts via letter or telephone, form letters, press releases or mass mailings that correct a widely disseminated error or address or frequently raised complaint.

3. Each agency must prepare a draft report, no later than April 1, 2002, providing the agency's information quality guidelines and explaining how such guidelines will ensure and maximize the quality, objectivity, utility, and integrity of information, including statistical information, disseminated by the agency. This report must also detail the administrative mechanisms developed by that agency to allow affected persons to seek and obtain appropriate correction of information maintained and disseminated by the agency that does not comply with the OMB or the agency guidelines.

4. The agency must publish a notice of availability of this draft report in the Federal Register, and post this report on the agency's website, to provide an opportunity for public comment.

5. Upon consideration of public comment and after appropriate revision, the agency must submit this draft report to the OMB for review regarding consistency

with these OMB guidelines no later than July 1, 2001. Upon completion of that OMB review and completion of this report, agencies must publish notice of the availability of this report in its final form in the Federal Register, and post this report on the agency's web site no later than October 1, 2002.

6. On an annual fiscal-year basis, each agency must submit a report to the Director of OMB providing information (both quantitative and qualitative, where appropriate) on the number and nature of complaints received by the agency regarding agency compliance with these OMB guidelines and how such complaints were resolved. Agencies must submit these reports no later than January 1 of each following year, with the first report due January 1, 2004.

V. Definitions

1. "Quality" is an encompassing term comprising utility, objectivity, and integrity. Therefore, the guidelines sometimes refer to these four statutory terms, collectively, as "quality."

2. "Utility" refers to the usefulness of the information to its intended users, including the public. In assessing the usefulness of information that the agency disseminates to the public, the agency needs to reconsider the uses of the information not only from perspective of the agency but also from the perspective of the public. As a result, when transparency of information is relevant for assessing the information's usefulness from the public's perspective, the agency must take care to ensure that transparency has been addressed in its review of the information.

3. "Objectivity" involves two distinct elements, presentations and substance.

a. "Objectivity" includes whether disseminated information is being presented in an accurate, clear, complete, and unbiased manner. This involves whether the information is presented within a proper context. Sometimes, in disseminating certain types of information to the public, other information must also be disseminated in order to ensure an accurate, clear, complete, and unbiased presentation. Also, the agency needs to identify the sources of the disseminated information (to the extent possible, consistent with confidentiality protections) and, in a specific, financial, or statistical context, the supporting data and models, so that the public can assess for itself whether there may be some reason to question the objectivity of the sources. Where appropriate, data should have full, accurate, transparent documentation, and error sources affecting data quality should be identified and disclosed to users.

b. In addition, "objectivity" involves a focus on ensuring accurate, reliable, and unbiased information. In a scientific, financial, or statistical context, the original and supporting data shall be generated, and the analytic results shall be developed, using sound statistical and research methods.

i. If data and analytic results have been subjected to formal, independent, external peer review, the information may generally be presumed to be of acceptable objectivity. However, this presumption is rebuttable based on a persuasive showing by the petitioner in a particular instance. If agency-

sponsored peer review is employed to help satisfy the objectivity standard, the review process employed shall meet the general criteria for competent and credible peer review recommended by OMB-OIRA to the President's Management Council (9/20/01) (http://www.whitehouse.gov/omb/inforeg/oira_review-process.html), namely, "that (a) peer reviewers be selected primarily on the basis of necessary technical expertise, (b) peer reviewers be expected to disclose to agencies prior technical/policy positions they may have taken on the issues at hand, (c) peer reviewers be expected to disclose to agencies their sources of personal and institutional funding (private or public sector), and (d) peer reviews be conducted in an open and vigorous manner."

ii. If an agency is response for disseminating influential scientific, financial, or statistical information, agency guidelines shall include a high degree of transparency about data and methods to facilitate the reproducibility of such information by qualified third parties.

A. With regard to original and supporting data related thereto, agency guidelines shall not require that all disseminated data be subjected to a reproducibility requirement. Agencies may identify, in consultation with the relevant scientific and technical communities, those particular types of data that can practicable be subjected to a reproducibility requirement, given ethical, feasibility, or confidentiality constraints. It is understood that reproducibility of data is an indication of transparency about research design and methods and thus a replication exercise (i.e., a new experiment, test, or sample) shall not be required prior to each dissemination.

B. With regard to analytic results related thereto, agency guidelines shall generally require sufficient transparency about data and methods that an independent reanalysis could be undertaken by a qualified member of the public. These transparency standards apply to agency analysis of data from a single study as well as to analyses that combine information from multiple studies.

i. Making the data and methods publicly available will assist in determining whether analytic results are reproducible. However, the objectivity standard does not override other compelling interests such as privacy, trade secrets, intellectual property, and other confidentiality protections.

ii. In situations where public access to data and methods will not occur due to other compelling interests, agencies shall apply especially rigorous robustness checks to analytic results and document what checks were undertaken. Agency guidelines shall, however, in all cases, require a disclosure of the specific data sources that have been used and the specific quantitative methods and assumptions that have been employed. Each agency is authorized to define the type of robustness checks, and the level of

detail for documentation thereof, in ways appropriate for it given the nature and multiplicity of issues for such the agency is responsible.

C. With regard to analysis of risks to human health, safety and the environment maintained or disseminated by the agencies, agencies shall either adopt or adapt the equality principles applied by Congress to risk information used and disseminated pursuant to the Safe Drinking Water Act Amendments of 1996 (42 U.S.C. 300g-1(b)(3)(A) & (B)). Agencies responsible for dissemination of vital health and medical information shall interpret the reproducibility and peer-review standards in a manner appropriate to assuring the timely flow of vital information from agencies to medical providers, patients, health agencies, and the public. Information quality standards may be waived temporarily by agencies under urgent situations (e.g., imminent threats to public health or homeland security) in accordance with the latitude specified in agency-specific guidelines.

4. "Integrity" refers to the security of information--protection of the information from unauthorized access or revision, to ensure that the information is not compromised through corruption or falsification.

5. "Information" means any communication or representation of knowledge such as facts or data, in any medium or form, including textual, numerical, graphic, cartographic, narrative, or audiovisual forms. This definition includes information that an agency disseminates from a web page, but does not include the provision of hyperlinks to information that others disseminate. This definition does not include opinions, where the agency's presentation makes it clear that what is being offered is someone's opinion rather than fact or the agency's views.

6. "Government information" means information created, collected, processed, disseminated, or disposed of by or for the Federal Government.

7. "Information dissemination product" means any books, paper, map, machine-readable material, audiovisual production, or other documentary material, regardless of physical form or characteristic, an agency disseminates to the public. This definition includes any electronic document, CD-ROM, or web page.

8. "Dissemination" means agency initiated or sponsored distribution of information to the public (see 5 CFR 1320.3(d) (definition of "Conduct or Sponsor")). Dissemination does not include distribution limited to government employees or agency contractors or grantees; intra- or inter-agency use or sharing of government information; and responses to requests for agency records under the Freedom of Information Act, the Privacy Act, the Federal Advisory Committee Act or other similar law. This definition also does not include distribution limited to correspondence with individuals or persons, press releases, archival records, public filings, subpoenas or adjudicative processes.

9. "Influential", when used in the phrase "influential scientific, financial, or statistical information", means that the agency can reasonably determine that dissemination of the information will have or does have a clear and substantial

impact on important public policies or important private sector decisions. Each agency is authorized to define "influential" in ways appropriate for it given the nature and multiplicity of issues for which the agency is responsible.

10. "Reproducibility" means that the information is capable of being substantially reproduced, subject to an acceptable degree of imprecision. For information judged to have more (less) important impacts, the degree of imprecision that is tolerate is reduced (increased). If agencies apply the reproducibility test to specific types of original or supporting data, the associated guidelines shall provide relevant definitions of reproducibility (e.g., standards for replication of laboratory data). With respect to analytic results, "capable of being substantially reproduced" means that independent analysis of the original or supporting data using identical methods would generate similar analytic results, subject to an acceptable degree of imprecision or error.

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Appendix 7. Selected RM-217 Technical Reviews

On RM-217 p. 33, 19 "technical reviewers" are listed. A FOIA request was submitted to the USDA Forest Service, Rocky Mountain Experiment Station, Fort Collins, Colorado, to obtain copies of the reviews. The transmittal letter that accompanied the reviews specified that six reviews could not be found. A total of 13 signed reviews and one unsigned review were provided. Of these 14 reviews, 10 were either relatively brief or formatted in response to specific statements, referred to by page number or other reference, and generally focused on relatively minor issues with little discussion.

Four reviews are particularly relevant to this petition because detailed comments and discussion were offered. The full text of these four reviews is included in this appendix.

Technical review by Rudy King

Subject: MS "Management recommendations for the northern goshawk in the southwestern United States"

I have read your manuscript about as thoroughly as a non-specialist can and have developed serious concerns about the basis presented for your committee's recommendations. Your committee chose an approach of literature analysis rather than direct study of the relevant goshawk population. There is nothing inherently wrong with this approach, but successful application requires a logical analysis framework, clearly supported assumptions and conclusions, and clearly described linkages among analysis steps and results.

Your decision to concentrate your analysis on prey populations seems well conceived, but flawed in execution since you never directly connect goshawk dietary requirements with associated prey population levels needed. Instead, you assume that optimal habitat is required for all prey species. This utopian ideal may be neither attainable nor required for healthy goshawk populations. You conclude (page 18) that VSS classes 4-6 should be emphasized in your recommendations without ever addressing whether adequate prey populations might exist if substantial portions of the landscape contained VSS classes 1-3. This conclusion is central to your recommendations and needs better arguments than you have presented.

Emphasis on VSS classes 4-6 is also not entirely consistent with the information presented, at least as I am able to piece the story together. Your presentation could reasonably be described as containing a sequence of landmarks with sometimes only vague footprints describing the routes taken in between. The presented life histories are not completely consistent, neither internally nor with summaries presented in Tables 4 and 5. And, the final management recommendations are presented with only limited linkages back to your prey population arguments and otherwise seem of fairly arbitrary structure. Are your management recommendations feasible and sustainable? I suggest that you need to directly address these questions in some detail.

This is an overview of my concerns and questions. I have also noted numerous questions and apparent inconsistencies in the text of the manuscript. My judgment is that you have not presented adequate support for your conclusions, and I hope that my concerns and questions are clear and understandable. I do not believe that you have presented adequate building blocks for your recommendations, especially from a silvicultural perspective, and the lack of clear linkages between conclusions and building blocks presented makes the foundation for your recommendations unstable. I would appreciate seeing the previous reviews of the manuscript, to ascertain whether I alone am concerned about these issues. Please advise if you wish to further discuss or require my assistance to address the necessary issues.

RUDY M. KING
Station Biometrician

Technical review by Wayne Shepperd

Date: 11/8/91

Subject: REVIEW OF INTERIM MANAGEMENT GUIDELINES FOR THE NORTHERN GOSHAWK

To: Goshawk Scientific Committee

Thank you very much for the opportunity to review these interim guidelines. I share the Committee's concern that many of our southwestern forest ecosystems are not in a healthy condition and applaud their foresight in recognizing that active silvicultural manipulation will be needed to restore and preserve viable goshawk habitats within these ecosystems.

While I agree with many of what I perceive to be the landscape management objectives delineated in these guidelines, I am confused and somewhat disturbed by other aspects of the report. As a silviculturist, I am concerned by the by the detail to which the Committee prescribed specific silvicultural activities in guidelines that are to be applicable under an infinite variety of conditions across the southwest. I believe that allowing managers to use only shelterwood and group selection to provide the landscape attributes desired for goshawk habitat is too restrictive. Selection of silvicultural methods should be done at the local level as part of the ID team process for individual management projects. Otherwise, much of the expertise and knowledge of silvicultural specialists will be lost from the management process.

The specificity of the guidelines is further confounded by the ambiguous terminology used to describe silvicultural activities and forest conditions in the proposed treatments. For example, the phrase "shelterwood in 2 acre patches" used throughout the document is very confusing. Does this mean that only scattered 2 acre patches of forest will be managed? If so, what will be done with the intervening forest? Or, does it mean that the landscape will be subdivided into 2 acre patches that will subsequently be managed as even-aged stands using the shelterwood regeneration method. Either case can have important on-the-ground management implications. In the former case, a large portion of landscapes would be excluded from management. In the latter, each 2 acre portion of a landscape would become an individual stand. A 6000 acre goshawk range would then have 3000 sites to keep track of over time!

Although not implicitly stated, I sense the Committee intended to lump even-aged 2 acre sites into groups of similar age classes to simplify record keeping. I believe this would be a back-door method of practicing uneven-aged management under area control, and not shelterwood at all.

Terminology used to describe stand conditions after harvest is confusing. I assume the reserve trees described in Appendix 4 are the

same trees referred to throughout the text as "large tree component", "large overstory trees", "dominant/codominant live trees", or the "6 live trees" specified to remain in VSS 1 and 2 acreage? The apparent importance of these trees in the overall management scheme for goshawks makes me think that they should not be considered reserve trees (or "standards" in silvicultural terminology), but be included as part of the regulated component. That could easily done under uneven-aged management. Something to think about.

The dimensions specified for patches are also confusing. For example, on page 54, an irregular 2 acre patch size is specified, but with a width no greater than l50 ft. Is this a maximum, minimum, or average dimension? Again, the distinction is important. A square l50 ft. on a side is only a half acre, but a 2 acre rectangle with a width of l50 ft. will be over a tenth of a mile (580 ft.) long.

I am also concerned that the specific actions proposed by the Committee will not sustain the landscape conditions they intended. The continual thinning from below illustrated in Fig. 5 will not maintain stands perpetually. One or two commercial thinnings from below should be sufficient to establish desired stand conditions. Repeated commercial thinning from below will result in evenly spaced savanna-like stands that do not meet vegetation structural stage objectives, or provide sufficient recruitment of snags and down woody debris.

Nor do I believe it is possible to maintain the specified percentages of vegetation structural stages specified in the guidelines. The proportions of structural stages needs to be balanced to provide enough acres of younger stages to replace older stages over time. It is not possible to maintain 20% of a landscape in VSS 3 as it matures to VSS 4 when there is only 10% of the landscape in VSS 2. The situation is analogous to attempting to manage an uneven-aged forest using a diameter distribution curve with a Q ratio less than 1.0.

Finally, I am bothered by the strong single resource orientation of these recommendations. I realize that this document was chartered in response to specific concerns about goshawk habitat in the southwest, but I also know that goshawks aren't the only resource managed in these forests. If goshawks are indeed a species whose vitality is indicative of overall ecosystem vigor, then a stronger identification of the multi-resource benefits of these proposed actions is needed in this document. Otherwise, the charge can be made that goshawk habitat will replace timber production as the paramount resource managed in southwestern forests.

I would offer the following suggestions to the Committee in revising these guidelines:

- Emphasize the forest conditions needed, not the details of how to achieve them. Describe in detail the age, size, and appearance of forests in the landscape, including horizontal and vertical structure as well as population aggregation. Specific statements quantifying types of trees, snags, forage, and openings are ok, just make sure they are clearly defined, make biologic sense,

and are achievable.

- Avoid jargon and ambiguous terminology.

- Drop VSS, its inappropriate and confusing to readers. If I had to look it up other non-R3 folks will too.

- Thoroughly discuss the multi-resource benefits and trade-offs of the proposed actions. Include an estimate of the total available forested acreage in R3 that will be affected. Discuss possible effects upon visual resources, deer and elk hiding and thermal cover, songbird habitat, bark beetle risk, dwarf mistletoe, etc. Mention what should done be for goshawk habitat in those forests in the unavailable component such as inoperable slopes, riparian and travel corridors.

I hope that these observations and suggestions will be helpful in revising these guidelines. I strongly believe that the management of southwestern forests should take a new direction and that new guidelines for managing all resources in these forests are needed. I will be happy to discuss my comments in detail with the Committee, or review future drafts.

Wayne D. Shepperd
Research Forester

Technical review by Carleton Edminster

Subject: Review of "Recommendations for interim management guidelines for the northern goshawk" (10/3/91)

Thank you for the opportunity to review these recommendations. I view these recommendations as a major step in attempting to express the committee's status of knowledge of habitat requirements for the northern goshawk in the Southwest and to present a model of forest ecosystem management to maintain and improve forest conditions for the goshawk. If my perception is correct, I agree with the committee's goal of recommending a landscape perspective and considering, in detail, the habitat requirements of a variety of prey species. For this review of the initial draft, I am limiting my comments and suggestions to my major concerns. This should not imply that I support the contents of other portions of the draft. I originally attempted to go into much more detail, but found my criticisms were becoming not constructive. I assume that a document of this scope will be developed through a series of iterations, and each iteration will receive appropriate technical review.

I will attempt to structure my comments from the standpoint of someone who is trying to develop a model of the structure, development, function and management of southwestern forest and woodland ecosystems with emphasis on what I understand to be habitat requirements for the goshawk as presented in the draft. First, a bit of model building philosophy. A model of something can only be as good as our understanding of what we are trying to model. Any modelling effort must rely on an accepted set of definitions and assumptions. For proper formulation, an exact terminology is critical.

The first major failing of the draft is in ambiguous and invented terminology to describe silvicultural activities, and tree, stand and forest conditions. Smith (1962) states that "the result is confusion that sometimes seems to increase rather than decrease with the amount of explanation." When I don't understand the use of certain words, I first go to standard definitions; if that doesn't work, I then try the glossary. Definitions in the glossary and explanations in the text led to a great deal of confusion on my part and resulted in increased levels of frustration the more I attempted to understand the messages the committee was attempting to convey. An example is the definition of main canopy. The definition published in the Federal Register is unintelligible. The definition in this draft applies only to even-aged stands (again, see Smith 1962 for a discussion of the use of crown classes in uneven-aged stands). Yet, main canopy seems to be an underlying concept in the description of many stand conditions. Then there is "nest buffer," "nest site," and "macro-nest site." For management, a single term "nest stand" might make more sense. Another example is vegetation structural stage (VSS). VSS is defined as a method of describing the growth stages of a stand of living trees.

Yet in many of the references to VSS, the term "forest" is used. In addition, VSS is supposedly based on tree size and total canopy cover. Yet, the descriptions for the stages are based on age. Now size and age are confounded, and the descriptions relate only to even-aged "forests!" More on this later.

Much of the terminology and many of the concepts presented in the draft imply an emphasis on even-aged management. Is this really what the committee intended?

Now, a second bit of modelling philosophy. When building a model for others to use, we owe it to our users not to imply a greater level of resolution to model results than our level of knowledge permits. Early in the draft, the committee states that information to manage nest habitat is available but comes from disparate regions, and that little information is available concerning forest conditions in foraging areas. Yet, the draft goes into great detail and specificity in formulating silvicultural guidelines to the extent that I question whether forest silviculturists are even needed to implement the recommendations. I perceive that the committee is recommending uneven-aged forest conditions at least at the landscape scale, yet most of the discussion centers on even-aged management without adequate knowledge that even-aged stand conditions are favored in the landscape. The selection of specific silvicultural activities to meet desired multiresource conditions needs to be left to an interdisciplinary management team with public input, not dictated by a document such as this. The committee should emphasize desired conditions described with as much detail as the level of knowledge permits. These conditions should be achievable and most importantly sustainable.

This leads me to another major criticism. There are apparently two disciplines represented on the committee, wildlife and timber. I doubt that the review process will provide adequate input from other disciplines. How will this shortcoming be corrected in future versions? The recommendations have profound implications in forest entomology, forest pathology, landscape architecture, hydrology, recreation and visuals, engineering, etc. As currently written, successful implementation will require precise area treatment, tracking, and identification. How will this implementation problem be handled? There is a lack of consideration of other resource values and trade-offs, the amount of forest and woodland area likely to be affected, and the tree and wildlife habitat resource is too narrowly discussed in the recommendations. As an example, how will the recommendations affect competitors of the goshawk? How do these recommendations fit into the normal FS planning process, environmental analysis, etc.?

Now on to some more specific comments. As mentioned earlier, VSS is "defined" at the stand level, used at the forest level, and involves two confounded tree characteristics, size and age. Arghh! In addition, it has the inherent weakness as either a stand or forest concept of being applicable only to even-aged stands. I recommend dropping the concept as inherently flawed. I view VSS as an attempt to get away from some former descriptions, especially for ponderosa pine in the Southwest, which were related to timber volumes and values. I have no problem with the reasoning for dropping these old classifications from a timber sales standpoint, given that management had been headed in the direction of emphasizing relatively young forest products. However, now we are faced with attempting to return to a forest condition where older trees are an integral component of the landscape

and the old classifications that describe these tree conditions provide a good communication base with other disciplines and the public for ponderosa pine. The old classifications are based on tree characteristics and can be applied at the tree, group of trees, stand, and forest levels. I prefer to only apply them at the tree and groups of trees level, given the variability in forest vegetation pattern in the Southwest. In addition, the classes have parallels to the other forest types. I agree with keeping 6 classes. In VSS the classes are 1. grass/forb/shrub (0-1 inch diameter), 2. seedling/sapling (1-5 inches), 3. young forest (5-12 inches), 4. mid-aged forest (12-18 inches), 5. mature forest (18-24 inches), 6. old forest (24+ inches). Throw out the size classes; they are confounded with age (the more useful qualitative descriptors), site quality, and stand density. Now I'll throw in 50 cents worth from Pearson (1950). Keep classes 1 and 2, with perhaps a modification that class 1 condition of "permanent" grass/forb/shrub needs to be differentiated from class 1 lands that will occupied by trees in the future. Pearson refers to class 3 as young blackjacks (perhaps a bit sexist with new perspectives), class 4 as blackjacks of saw-timber size (too product related), class 5 as intermediates or young yellow pines (intermediates may be confused with the crown class), and class 6 as old yellow pines. Each of Pearson's classes has distinctive characteristics, and the qualitative description certainly fits with our level of knowledge of goshawk habitat characteristics. I would suggest modified titles for the classes as: 3. young black-barked trees, 4. large (older) black-barked trees, 5. transition from black-barked trees and young yellow pines, and 6. old yellow pines. Similar broad age-related classes could also be defined for the other forest types. Discussion of stand conditions should be based on these tree characteristics and how trees or groups of trees of similar conditions should be integrated at the stand, with a measure of density such as canopy closure or cover, and then forest level to reach desired conditions.

Another comment regarding VSS, given our level of knowledge, do we really know that 10, 8, 18, 11,21,26 percent in each of the classes is required for ponderosa pine or spruce-fir? And why is the mix for mixed species different? And how can these effectively different age classes (not size classes) be sustainable when a younger class occupies a smaller percentage of the area than an older class? I suspect these percentages come from growth projections of average diameter in even-aged stands. Given the level of our knowledge, I suggest a more defensible approach would be to assign each category an equal percentage with allowance for areas which will remain nonstocked by trees.

Now some specific comments regarding "minimum structural attributes for stockable areas within suitable nest sites" (table 2). The table refers to main canopy. As discussed earlier, the definition of main canopy is only applicable to even-aged stands. Are the nest sites therefore required to be even-aged stands? Has sufficient sampling been done to justify limiting desired conditions for nest sites (stands) to even-aged conditions? The minimum required age for ponderosa pine is equal to the maximum pathological age, and the minimum required age for mixed species is 50 years greater than the pathological age for Douglas-fir and white fir. I would presume that these nest sites should be sustainable for a certain period of years.

Sustainability is risky given these conditions. Total (stand) basal areas of the level required in even-aged stands invites infestation by bark beetles. In other studies of intensive control of stand density in even-aged stands of ponderosa pine in northern California, eastern Oregon, and the Black Hills, epidemic levels of infestation by western and mountain pine beetles has occurred at the minimum required levels. From a practical standpoint, a forester is doing well to estimate site index to the nearest 10-foot class. Yet the table makes a very definite break for "high" and "low" site indexes for ponderosa pine and mixed species. Does the level of knowledge support these precise breaks? If tree size, and density in terms of trees per acre and basal area per acre are important in concert, I suggest computing average diameter as the diameter of the tree of average basal area. A final note of serious concern. Reynolds has described to me a procedure for sampling conditions around the nest tree which is biased to the condition in the immediate vicinity of the nest tree and the prey plucking post. I am not familiar with other studies of nest sites, but information collected using the methodology of Reynolds cannot be reliably extrapolated to a 30-acre stand area. We have a systematic sample of 7 ponderosa pine nest sites and 1 pinyon-juniper nest site from the south Kaibab N.F. which demonstrate some interesting patterns across the delineated nest stand area. I realize that conditions on the south Kaibab are quite different from the north Kaibab and from other areas in the ponderosa pine and mixed species types. The fact that characteristics in these stands do not meet conditions in table 2, certainly demonstrates the need for further research, for the nest site, the PFAs, and the foraging areas. Our limited analysis demonstrates the need to consider both requirements for the group of trees containing the nest and patterns in the surrounding stand in the nest site. Results of this admittedly small sample certainly casts doubt on the extrapolation of results from other areas and regions without validation for use in the Southwest. Procedures for sampling forest vegetation at the multistand level has reached a high level of refinement in forest inventory. I strongly suggest this methodology be applied at various rates of per unit area intensity in the recognized habitat areas for the goshawk, before such rigid minimum conditions are formulated as in table 2. This effort would have the added benefit, that procedures would produce information comparable to current stand examination procedures and analysis so that a new processing structure would not be required. We would be happy to be involved in both the sampling design and analysis.

I am very concerned that without proper supporting information, the recommendations in this draft may not result in desired outcomes. At the very least the recommendations are too specific, narrow in scope, and very possibly unattainable or at least unsustainable. A final question, with all the concern over below cost sales, who is going to pay for all the recommended habitat manipulation?

I hope these limited comments are useful. I would be happy to discuss them further.

/s/ Carl Edminster

CARLETON B. EDMINSTER
Project Leader

Technical review by William M. Block

Subject: Northern goshawk recommendations

I gave the "Management Recommendations for the Northern Goshawk in the Southwestern United States" a relatively quick reading. I think that the scientific committee should be commended for assembling an holistic approach to goshawk management under strict time constraints. In general, I found the model presented by the committee to represent a plausible alternative for goshawk management. Perhaps my biggest concern, however, is that the committee has developed a somewhat precise model using very imprecise data. By imprecise data, I refer to the fact that little empirical data are used as a basis for natural history information on the goshawk or for its prey. Most information is gleaned from the literature, and whether or not it applies to goshawks and prey species in the southwest is unknown. That certainly does not negate the accuracy of the nodel, but it does require that the model be tested prior to widescale implementation. Model testing and refinement are critical steps in the development of any useful model, and they should not be ignored in the development of this goshawk model. This concept (not caveat, per se) should be presented early in the document to establish that these management guidelines are the first step in the development of more effective strategies.

I have a couple of general comments. First, measurement units should be in metric, not English equivalents. Second, the document relies far to much on "ms. in prep.", or on "pers. obs." and "pers. comm". These are unacceptable sources of information for use in most scientific publication. I suggest that the authors locate support for their assertions from the established literature.

As noted above, I view the guidelines as a conceptual model. Any model is based on a set of underlying assumptions. The assumptions should be stated a priori and quite clearly. In turn, these assumptions should be tested to determine their validity and effects of assumption violations on the model accuracy. Obviously, tests of model assumptions comes under the auspices of research needs. In this regard, a separate section should be added to the end or the main text outlining a logical research agenda with specific research needs. I present below assumptions of the model that I think should be listed. The page numbers below refer to the locations of statements that implied these assumptions.

1. Declines in goshawk populations are related to declines in prey populations (page 4).

2. Food and nest habitat are the principle limiting factors to goshawk populations (page 4).

3. Population densities of larger goshawk prey are less than population densities of smaller prey (pages 10 and 11).

4. Prey should be abundant throughout the PFA (page 13)

5. Higher prey abundances will be found in VSSs 4,5, and 6 (page 18).

6. Human-wrought forest modifications affect habitat use by goshawks and availability of prey (page 21).

7. Active management is needed to produce and maintain goshawk habitat (page 22).

8. Providing suitable goshawk habitat will benefit many other species (page 43).

9. Models of habitat use by prey species are accurate and provide a sound basis for management (pages 91-157).

Various research needs logically follow from these basic assumptions. Note, that I have not addressed silvicultural aspects of the model. I defer to the expertise of Wayne Sheppard and Carl Edminster in this regard. If Wayne, Carl, and my suggestions are incorporated or adequately addressed in the document, I would have no problem approving or suggesting that John Rinne approve the ms. If I can provide any further information, please do not hesitate to contact me.

Sincerely,

/s/ Bill Block
WILLIAM M. BLOCK
RESEARCH WILDLIFE BIOLOGIST