

SECTION 1 | FRAMEWORK FOR THE ANALYSIS

1. The purpose of this report is to estimate the economic impact of actions taken to protect the federally listed Canada lynx (*Lynx Canadensis*) and their habitat. It attempts to quantify the economic impacts to activities occurring within the study area.¹ It does so by taking into account the cost of conservation efforts associated with economic activities within the study area boundaries. The analysis looks retrospectively at costs incurred since the lynx was listed in 2000, and forecasts impacts after the proposed critical habitat is finalized in 2006.
2. This information is intended to assist the Secretary in determining whether the benefits of excluding particular areas from the designation outweigh the benefits of including those areas in the designation.² In addition, this information allows the Service to address the requirements of Executive Orders 12866 and 13211, and the Regulatory Flexibility Act (RFA), as amended by the Small Business Regulatory Enforcement Fairness Act (SBREFA).³ This report also complies with direction from the U.S. Court of Appeals for the 10th Circuit that “co-extensive” effects should be included in the economic analysis to inform decision-makers regarding which areas to designate as critical habitat.⁴
3. This section describes the framework for the analysis. First, it describes the general analytic approach to estimating economic effects, including a discussion of both efficiency and distributional effects. Next, this section discusses the scope of the analysis, including the link between existing and critical habitat-related protection efforts and economic impacts. It then presents the analytic time frame used in the report. Finally, this section lists the information sources relied upon in the analysis.

¹ For the purposes of this analysis, the “study area” is defined as both areas proposed for critical habitat designation, as well as areas considered for exclusion from critical habitat.

² 16 U.S.C. 1533(b)(2).

³ Executive Order 12866, Regulatory Planning and Review, September 30, 1993; Executive Order 13211, Actions Concerning Regulations That Significantly Affect Energy Supply, Distribution, or Use, May 18, 2001; 5 U.S.C. “601 et seq; and Pub Law No. 104-121.

⁴ In 2001, the U.S. Court of Appeals for the 10th Circuit instructed the Service to conduct a full analysis of all of the economic impacts of proposed critical habitat, regardless of whether those impacts are attributable co-extensively to other causes (*New Mexico Cattle Growers Ass’n v. U.S.F.W.S.*, 248 F.3d 1277 (10th Cir. 2001)).

1.1 APPROACH TO ESTIMATING ECONOMIC EFFECTS

4. This economic analysis considers both the economic efficiency and distributional effects that may result from efforts to protect the lynx and its habitat (hereinafter referred to collectively as “lynx conservation efforts”). Economic efficiency effects generally reflect “opportunity costs” associated with the commitment of resources required to accomplish species and habitat conservation. For example, if activities that can take place on a parcel of land are limited as a result of the designation or the presence of the species, and thus the market value of the land is reduced, this reduction in value represents one measure of opportunity cost or change in economic efficiency. Similarly, the costs incurred by a Federal action agency to consult with the Service under section 7 represent opportunity costs of lynx conservation efforts.
5. This analysis also addresses the distribution of impacts associated with the designation, including an assessment of any local or regional impacts of habitat conservation and the potential effects of conservation efforts on small entities and the energy industry. This information may be used by decision-makers to assess whether the effects of lynx conservation efforts unduly burden a particular group or economic sector. For example, while conservation efforts may have a relatively small impact relative to the national economy, individuals employed in a particular sector of the regional economy may experience relatively greater impacts. The difference between economic efficiency effects and distributional effects, as well as their application in this analysis, are discussed in greater detail below.

1.1.1 EFFICIENCY EFFECTS

6. At the guidance of the Office of Management and Budget (OMB) and in compliance with Executive Order 12866 "Regulatory Planning and Review," Federal agencies measure changes in economic efficiency in order to understand how society, as a whole, will be affected by a regulatory action. In the context of regulations that protect lynx habitat, these efficiency effects represent the opportunity cost of resources used or benefits foregone by society as a result of the regulations. Economists generally characterize opportunity costs in terms of changes in producer and consumer surpluses in affected markets.⁵
7. In some instances, compliance costs may provide a reasonable approximation for the efficiency effects associated with a regulatory action. For example, a Federal land manager, such as the U.S. Forest Service, may enter into a consultation with the Service to ensure that a particular activity will not adversely modify critical habitat. The effort required for the consultation is an economic opportunity cost because the landowner or manager's time and effort would have been spent in an alternative activity had the parcel not been included in the designation. When compliance activity is not expected to significantly affect markets -- that is, not result in a shift in the quantity of a good or

⁵ For additional information on the definition of "surplus" and an explanation of consumer and producer surplus in the context of regulatory analysis, see: Gramlich, Edward M., A Guide to Benefit-Cost Analysis (2nd Ed.), Prospect Heights, Illinois: Waveland Press, Inc., 1990; and U.S. Environmental Protection Agency, Guidelines for Preparing Economic Analyses, EPA 240-R-00-003, September 2000, available at <http://yosemite.epa.gov/ee/epa/eed.nsf/webpages/Guidelines.html>.

service provided at a given price, or in the quantity of a good or service demanded given a change in price -- the measurement of compliance costs can provide a reasonable estimate of the change in economic efficiency.

8. Where habitat protection measures are expected to significantly impact a market, it may be necessary to estimate changes in producer and consumer surpluses. For example, a designation that precludes the development of large areas of land may shift the price and quantity of housing supplied in a region. In this case, changes in economic efficiency (i.e., social welfare) can be measured by considering changes in producer and consumer surplus in the market.
9. This analysis begins by measuring costs associated with efforts undertaken to protect lynx and their habitat. As noted above, in some cases, compliance costs can provide a reasonable estimate of changes in economic efficiency. However, if the cost of conservation efforts is expected to significantly impact markets, the analysis will consider potential changes in consumer and/or producer surplus in affected markets.

1.1.2 DISTRIBUTIONAL AND REGIONAL ECONOMIC EFFECTS

10. Measurements of changes in economic efficiency focus on the net impact of conservation efforts, without consideration of how certain economic sectors or groups of people are affected. Thus, a discussion of efficiency effects alone may miss important distributional considerations. OMB encourages Federal agencies to consider distributional effects separately from efficiency effects.⁶ This analysis considers several types of distributional effects, including impacts on small entities; impacts on energy supply, distribution, and use; and regional economic impacts. It is important to note that these are fundamentally different measures of economic impact than efficiency effects, and thus cannot be added to or compared with estimates of changes in economic efficiency.

Impacts on Small Entities and Energy Supply, Distribution, and Use

11. This analysis considers how small entities, including small businesses, organizations, and governments, as defined by the Regulatory Flexibility Act, might be affected by future lynx conservation efforts.⁷ In addition, in response to Executive Order 13211 "Actions Concerning Regulations That Significantly Affect Energy Supply, Distribution, or Use," this analysis considers the future impacts of conservation efforts on the energy industry and its customers.⁸

⁶ U.S. Office of Management and Budget, "Circular A-4," September 17, 2003, available at <http://www.whitehouse.gov/omb/circulars/a004/a-4.pdf>.

⁷ 5 U.S.C. ' 601 et seq.

⁸ Executive Order 13211, Actions Concerning Regulations That Significantly Affect Energy Supply, Distribution, or Use, May 18, 2001.

Calculating Present Value and Annualized Impacts

For each land use activity, this analysis presents economic impacts incurred in different time periods in present value terms. The present value represents the value of a payment or stream of payments in common dollar terms. That is, it is the sum of a series of past or future cash flows expressed in today's dollars. Translation of the economic impacts of past or future costs to present value terms requires the following: a) past or projected future costs of lynx conservation efforts; and b) the specific years in which these impacts have been or are expected to be incurred. With these data, the present value of the past or future stream of impacts (PV_c) of lynx conservation efforts from year t to T is measured in 2006 dollars according to the following standard formula:^a

$$PV_c = \sum_{t=t_0}^{t=T} \frac{C_t}{(1+r)^{t-2006}}$$

C_t = cost of lynx conservation efforts in year t

r = discount rate^b

Impacts of conservation efforts for each activity in each unit are also expressed as annualized values (i.e., the series of equal annual costs over some defined time period that have the same present value as estimated total impacts). Annualized values are calculated to provide comparison of impacts across activities with varying forecast periods (T). For this analysis, all activities employ a forecast period of 20 years, 2006 through 2025, except the analysis of impacts of restricting pre-commercial thinning (as discussed in Section 3), which employs a forecast period of 100 years due to the time horizon over which silviculture activities are planned. In order to compare impacts across activities, however, this analysis reports the annualized impacts of pre-commercial thinning restrictions over the first 20 years. Annualized impacts of future lynx conservation efforts (APV_c) are calculated by the following standard formula:

$$APV_c = PV_c \left[\frac{r}{1 - (1+r)^{-N}} \right]$$

N = number of years in the forecast period (in this analysis, 20 or 100 years)

^a To derive the present value of past conservation efforts for this analysis, t is 2000 and T is 2005; to derive the present value of future conservation efforts, t is 2006 and T is 2025.

^b To discount and annualize costs, guidance provided by the OMB specifies the use of a real rate of seven percent. In addition, OMB recommends sensitivity analysis using other discount rates such as three percent, which some economists believe better reflects the social rate of time preference. (U.S. Office of Management and Budget, Circular A-4, September 17, 2003 and U.S. Office of Management and Budget, "Draft 2003 Report to Congress on the Costs and Benefits of Federal Regulations; Notice," 68 *Federal Register* 5492, February 3, 2003.)

Regional Economic Effects

12. Regional economic impact analysis can provide an assessment of the potential localized effects of conservation efforts. Specifically, regional economic impact analysis produces a quantitative estimate of the potential magnitude of the initial change in the regional economy resulting from a regulatory action. Regional economic impacts are commonly measured using regional input/output models. These models rely on multipliers that represent the relationship between a change in one sector of the economy (e.g., expenditures by recreationists) and the effect of that change on economic output, income, or employment in other local industries (e.g., suppliers of goods and services to recreationists). These economic data provide a quantitative estimate of the magnitude of shifts of jobs and revenues in the local economy.
13. The use of regional input/output models in an analysis of the impacts of species and habitat conservation efforts can overstate the long-term impacts of a regulatory change. Most importantly, these models provide a static view of the economy of a region. That is, they measure the initial impact of a regulatory change on an economy but do not consider long-term adjustments that the economy will make in response to this change. For example, these models provide estimates of the number of jobs lost as a result of a regulatory change, but do not consider re-employment of these individuals over time or other adaptive responses by impacted businesses. In addition, the flow of goods and services across the regional boundaries defined in the model may change as a result of the regulation, compensating for a potential decrease in economic activity within the region.
14. Despite these and other limitations, in certain circumstances regional economic impact analysis may provide useful information about the scale and scope of localized impacts. It is important to remember that measures of regional economic effects generally reflect shifts in resource use rather than efficiency losses. Thus, these types of distributional effects are reported separately from efficiency effects (i.e., not summed). In addition, measures of regional economic impact cannot be compared with estimates of efficiency effects, but should be considered as distinct measures of impact.

1.2 SCOPE OF THE ANALYSIS

15. This analysis identifies those economic activities most likely to threaten the listed species and its habitat and, where possible, quantifies the economic impact to avoid, mitigate, or compensate for such threats within the boundaries of the study area. Due to the difficulty in making a credible distinction between listing and critical habitat effects within critical habitat boundaries, this analysis considers all future conservation-related impacts to be coextensive with the designation.^{9,10}

⁹ In 2001, the U.S. Court of Appeals for the 10th Circuit instructed the Service to conduct a full analysis of all of the economic impacts of proposed critical habitat, regardless of whether those impacts are attributable co-extensively to other causes (*New Mexico Cattle Growers Assn v. U.S.F.W.S.*, 248 F.3d 1277 (10th Cir. 2001)).

¹⁰ In 2004, the U.S. Ninth Circuit invalidated the Service's regulation defining destruction or adverse modification of critical habitat (*Gifford Pinchot Task Force v. United States Fish and Wildlife Service*). The Service is currently reviewing the

16. Coextensive effects may also include impacts associated with overlapping protective measures of other Federal, state, and local laws that aid habitat conservation in the areas proposed for designation. In past instances, some of these measures have been precipitated by the listing of the species and/or impending designation of critical habitat. Because conservation efforts affording protection to a listed species likely contribute to the efficacy of critical habitat designation, the impacts of these actions are considered relevant for understanding the full effect of critical habitat designation. Enforcement actions taken in response to violations of the Act, however, are not included.

1.2.1 SECTIONS OF THE ACT RELEVANT TO THE ANALYSIS

17. This analysis focuses on activities that are influenced by the Service through sections 4, 7, 9, and 10 of the Act. Section 4 of the Act focuses on the listing and recovery of endangered and threatened species, as well as the critical habitat. In this section, the Secretary is required to list species as endangered or threatened "solely on the basis of the best available scientific and commercial data."¹¹ Section 4 also requires the Secretary to designate critical habitat "on the basis of the best scientific data available and after taking into consideration the economic impact, and any other relevant impact, of specifying any particular area as critical habitat."¹²
18. The protections afforded to threatened and endangered species and their habitat are described in sections 7, 9, and 10 of the Act, and economic impacts resulting from these protections are the focus of this analysis:
- Section 7 of the Act requires Federal agencies to consult with the Service to ensure that any action authorized, funded, or carried out will not likely jeopardize the continued existence of any endangered or threatened species or result in the destruction or adverse modification of critical habitat. The administrative costs of these consultations, along with the costs of project modifications resulting from these consultations, represent compliance costs associated with the listing of the species and proposed critical habitat.¹³
 - Section 9 defines the actions that are prohibited by the Act. In particular, it prohibits the "take" of endangered wildlife, where "take" means to "harass, harm, pursue, or collect, or to attempt to engage in any such conduct."¹⁴ The economic impacts associated with this section manifest themselves in sections 7 and 10.

decision to determine what effect it (and to a limited extent *Center for Biological Diversity v. Bureau of Land Management* (Case No. C-03-2509-SI, N.D. Cal.)) may have on the outcome of consultations pursuant to section 7 of the Act.

¹¹ 16 U.S.C. 1533.

¹² 16 U.S.C. 1533.

¹³ The Service notes, however, that a recent Ninth Circuit judicial opinion, *Gifford Pinchot Task Force v. United States Fish and Wildlife Service*, has invalidated the Service's regulation defining destruction or adverse modification of critical habitat. The Service is currently reviewing the decision to determine what effect it (and to a limited extent *Center for Biological Diversity v. Bureau of Land Management* (Case No. C-03-2509-SI, N.D. Cal.)) may have on the outcome of consultations pursuant to section 7 of the Act.

¹⁴ 16 U.S.C. 1532.

- Under section 10(a)(1)(B) of the Act, an entity (e.g., a landowner or local government) may develop a Habitat Conservation Plan (HCP) for an endangered animal species in order to meet the conditions for issuance of an incidental take permit in connection with the development and management of a property.¹⁵ The requirements posed by the HCP may have economic impacts associated with the goal of ensuring that the effects of incidental take are adequately minimized and mitigated. The designation of critical habitat does not require completion of an HCP; however, the designation may influence conservation measures provided under HCPs.

1.2.2 OTHER RELEVANT PROTECTION EFFORTS

19. The protection of listed species and habitat is not limited to the Act. Other Federal agencies, as well as state and local governments, may also seek to protect the natural resources under their jurisdiction. For the purpose of this analysis, such protective efforts are considered to be co-extensive with the protection offered by critical habitat, and costs associated with these efforts are included in this report. In addition, under certain circumstances, critical habitat may provide new information to a community about the sensitive ecological nature of a geographic region, potentially triggering additional economic impacts under other state or local laws. In cases where these costs would not have been triggered absent the designation of critical habitat, they are included in this economic analysis.

1.2.3 ADDITIONAL ANALYTIC CONSIDERATIONS

20. This analysis also considers the potential for other types of economic impacts that can be related to section 7 consultations in general and critical habitat in particular, including time delay, regulatory uncertainty, and stigma impacts.

Time Delay and Regulatory Uncertainty Impacts

21. Time delays are costs due to project delays associated with the consultation process or compliance with other regulations. Regulatory uncertainty costs occur in anticipation of having to modify project parameters (e.g., retaining outside experts or legal counsel to better understand their responsibilities with regard to critical habitat). For example, in the case of the lynx critical habitat, landowners of private timberland inholdings in National Forests have expressed concern that there may be delays associated with using U.S. Forest Service roads to access their lands if critical habitat is designated for the lynx. This is discussed in Section 3 of this analysis.

Stigma Impacts

22. Stigma refers to the change in economic value of a particular project or activity due to negative (or positive) perceptions of the role critical habitat will play in developing, implementing, or conducting that policy. For example, changes to private property values associated with public attitudes about the limits and costs of implementing a

¹⁵ U.S. Fish and Wildlife Service, "Endangered Species and Habitat Conservation Planning," August 6, 2002, accessed at <http://endangered.fws.gov/hcp/>.

project in critical habitat are known as "stigma" impacts. This analysis does not quantify any stigma impacts associated with the proposed critical habitat designation for the lynx.

1.2.4 BENEFITS

23. Under Executive Order 12866, OMB directs Federal agencies to provide an assessment of both the social costs and benefits of proposed regulatory actions.¹⁶ OMB's Circular A-4 distinguishes two types of economic benefits: *direct benefits and ancillary benefits*. Ancillary benefits are defined as favorable impacts of a rulemaking that are typically unrelated, or secondary, to the statutory purpose of the rulemaking.¹⁷
24. In the context of critical habitat, the primary purpose of the rulemaking (i.e., the direct benefit) is the potential to enhance conservation of the species. The published economics literature has documented that social welfare benefits can result from the conservation and recovery of endangered and threatened species. In its guidance for implementing Executive Order 12866, OMB acknowledges that it may not be feasible to monetize, or even quantify, the benefits of environmental regulations due to either an absence of defensible, relevant studies or a lack of resources on the implementing agency's part to conduct new research.¹⁸ *Rather than rely on economic measures, the Service believes that the direct benefits of the proposed rule are best expressed in biological terms that can be weighed against the expected cost impacts of the rulemaking.*
25. Critical habitat designation may also generate ancillary benefits. Critical habitat aids in the conservation of species specifically by protecting the primary constituent elements on which the species depends. To this end, critical habitat designation can result in maintenance of particular environmental conditions that may generate other social benefits aside from the preservation of the species. That is, management actions undertaken to conserve a species or habitat may have coincident, positive social welfare implications, such as increased recreational opportunities in a region. While they are not the primary purpose of critical habitat, these ancillary benefits may result in gains in employment, output, or income that may offset the direct, negative impacts to a region's economy resulting from actions to conserve a species or its habitat.
26. It is often difficult to evaluate the ancillary benefits of critical habitat designation. To the extent that the ancillary benefits of the rulemaking may be captured by the market through an identifiable shift in resource allocation, they are factored into the overall economic impact assessment in this report. For example, if habitat preserves are created to protect a species, the value of existing residential property adjacent to those preserves may increase, resulting in a measurable positive impact. Where data are available, this analysis attempts to capture the *net* economic impact (i.e., the increased regulatory

¹⁶ Executive Order 12866, Regulatory Planning and Review, September 30, 1993.

¹⁷ U.S. Office of Management and Budget, "Circular A-4," September 17, 2003, available at <http://www.whitehouse.gov/omb/circulars/a004/a-4.pdf>.

¹⁸ *Ibid.*

burden less any discernable offsetting market gains), of species conservation efforts imposed on regulated entities and the regional economy.

27. The lynx has a demonstrated use value, trapping and pelt sales, historically within portions of the study area, and currently in other regions. For example, in Washington State, lynx trapping occurred historically; hunting and trapping seasons were closed when the lynx was listed as a candidate species in Washington in 1991.¹⁹ Additionally, lynx trapping occurs in all Canadian Provinces except New Brunswick, where the lynx is considered regionally endangered. This analysis does not quantify use values associated with potential future lynx trapping activities within the study area as a benefit associated with critical habitat designation. This is due to the lack of information regarding: a) how the lynx population in the study area is expected to change over time; and b) at what population thresholds the lynx may be delisted and trapping allowed.
28. Lynx conservation may also result in economic benefits associated with wildlife viewing. This analysis does not, however, quantify enhanced wildlife viewing associated with lynx conservation. First, data are not available regarding the number of wildlife viewing participants within the study area. Information is also not available to estimate the increment by which wildlife viewing may be improved if the lynx conservation efforts described in this analysis are undertaken. More specifically, the extent to which the likelihood of viewing lynx is increased due to lynx conservation efforts, and the incremental value of a wildlife viewing trip associated with lynx sightings, are unknown.

1.2.5 GEOGRAPHIC SCOPE OF THE ANALYSIS

29. The geographic scope of the analysis includes areas intended to be proposed for critical habitat designation as well as areas considered for exclusion from critical habitat, collectively referred to as the "study area" for the purposes of this analysis. The economic impacts of the critical habitat designation are estimated for each of these two categories of land identified in the proposed rule. The analysis focuses on activities within or affecting these areas.
30. Section 2 describes the geographic scale at which results of the analysis are aggregated.

¹⁹ Stinson, D. 2001. State of Washington Lynx Recovery Plan. Washington Department of Fish and Wildlife.

Defenders of Wildlife’s Economic Impact Assessment of Critical Habitat for the Lynx

An existing study by the Defenders of Wildlife (DOW) regarding the economic impacts of critical habitat for the lynx attempts to quantify economic costs as well as the use and non-use benefits of critical habitat designation for the lynx.¹ Appendix B of this analysis includes a discussion of the methods used in the DOW report to estimate the benefits of critical habitat designation for the lynx and the limitations of applying the results in this draft economic analysis (DEA).

The analytic methods used in this DEA to quantify impacts to land use activities associated with lynx conservation efforts are comparable to those used in the DOW report. The analyses differ, however, in terms of scope. First, this DEA is limited geographically to the boundaries of proposed critical habitat; in the absence of information on the boundaries of critical habitat, the DOW report applied case studies of two regions within the range of the lynx in Maine and Montana. Second, this analysis applies a time frame of 20 years; the DOW report forecasts impacts over ten years. Further, the DOW report describes impacts associated solely with section 7 of the Act related to the critical habitat designation of the lynx. That is, it assigns a definition to “jeopardy” and “adverse modification” in order to isolate the incremental impacts of the critical habitat rulemaking. In contrast, as described above, this DEA considers all future conservation-related impacts to be coextensive with the designation.

Additionally, the DOW report attempts to assign values to the public's willingness to pay for improved prospects for lynx recovery, preservation of undeveloped landscapes, and maintenance of biodiversity as a result of critical habitat designation. Generally, DOW used existing studies estimating values of species and ecological services to quantify benefits. Specifically, the analysis applied a benefits transfer using an existing contingent valuation study for a river otter in the United Kingdom. While benefits transfer is not an uncommon approach and is appropriate when applied following certain guidelines, the DOW report applies a number assumptions in order to conduct their transfer that are not appropriate for application in this analysis. For example, absent any information on the potential change in lynx population that may be associated with critical habitat designation, the DOW assumes an increase in lynx population of between ten and 25 percent; this assumption is not based in any scientific study of the potential affects of designation on the population of this species. Further, the DOW report transfers the values of a single study. The Office of Management and Budget (OMB) guidelines for conducting a credible benefits transfer notes that the studies should be reviewed to determine whether the following things are comparable: 1) the commodity being valued; 2) the baseline and extent of change; and 3) the effected populations (those valuing the commodity). In the case of the DOW study, the commodities being valued have significant differences; while the animals are both carnivores of comparable size, their basic habitat types are different (rivers compared to forested land). In addition, while the extent of change is similar (25 percent population increase), the level of assumed population change for the lynx in the DOW report is not supported, and information is not available regarding the baseline population levels. Finally, the affected populations reside in different countries (the United Kingdom and the U.S.) with potentially different value structures.

The second category of benefit of critical habitat described in the DOW report is preservation of undeveloped landscapes, and the associated preservation of ecosystem services and biodiversity. DOW notes, however, that limited information is available to quantify the full value of these benefits. As a result, the majority (99 percent in the Montana case study) of quantified benefits in the DOW report are associated with the willingness to pay for increased lynx populations. The method used to estimate these benefits, and the limitations of applying them in this analysis, are discussed in more detail in Appendix B.

1.3 ANALYTIC TIME FRAME

31. The analysis estimates impacts based on activities that are "reasonably foreseeable," including, but not limited to, activities that are currently authorized, permitted, or funded, or for which proposed plans are currently available to the public. The analysis estimates economic impacts to activities from 2000 (year of the species' final listing) to 2025 (20 years from the expected year of final critical habitat designation). Estimated impacts are divided into pre-designation (2000-2005) and post-designation (2006-2025) impacts. The land uses within the study area are not expected to substantially change over this time period.
32. Where information is available to reliably forecast economic activity beyond the 20-year time frame, this analysis incorporates that information. The only activity for which long-term planning information is available is timber management. This analysis estimates impacts of modifications to timber harvest management over a 100 year time frame (2006 - 2105) to match the average time horizon over which timber harvest rotations are planned. In order to compare impacts across activities, however, this analysis reports the annualized impacts of pre-commercial thinning restrictions over the first 20 years.

1.4 INFORMATION SOURCES

33. The primary sources of information for this report are communications with and data provided by personnel from the Service, Federal, state, and local governments and other stakeholders. In addition, this analysis relies upon the Service's section 7 consultation records, transcripts from public hearings and public comments on the proposed rule. Due to the high number of entities contacted, the complete list of contacted stakeholders is within the reference section at the end of this document.
34. The primary assumption applied in the analysis is that *lynx conservation measures from the Lynx Conservation Assessment Strategy (LCAS) will be implemented across public and private lands within the study area.*²⁰ While various states have based their lynx management or habitat conservation plans on the LCAS, most private lands are not currently being managed to meet LCAS standards. This analysis assumes that increased public pressure on the Service and industries associated with critical habitat to conserve lynx could potentially lead to changes in silviculture practices, development projects, recreation, mining, and other activities on private lands. As the LCAS is considered by the Service to be the best information available regarding conservation measures for the lynx, the analysis assumes that, absent more specific information, public and private landowners across the potential critical habitat will use the LCAS as a model for lynx conservation needs. Where more specific conservation standards have been developed for use in a particular area, such as in the Superior National Forest Plan, these are quantified

²⁰Ruediger, B., et. al. 2000. Canada lynx conservation assessment and strategy 2nd Edition. August 2000 (as amended Oct. 23-24, 2001, May 6-8, 2003 and Nov. 12-13, 2003). USDA Forest Service, U.S. Fish and Wildlife Service, Bureau of Land Management, and National Park Service. Forest Service Publication #R1-00-53. Available for download at: <http://mountain-prairie.fws.gov/species/mammals/lynx/miscellaneous.htm>.

in place of the LCAS standards in this analysis. Specific LCAS conservation measures applied to each activity are highlighted in Exhibit 1-1.

EXHIBIT 1-1. LCAS CONSERVATION GUIDELINES

ACTIVITY	CONSERVATION GUIDELINES
Timber	Pre-commercial thinning will be allowed only when stands no longer provide snowshoe hare habitat.
Development	Not addressed in LCAS.
Recreation	No net increase in over the snow routes.
Public Lands Management	<ul style="list-style-type: none"> • Lynx habitat will be mapped using criteria specific to each geographic area to identify appropriate vegetation and environmental conditions. • Prepare a broad-scale assessment of landscape patterns that compares historical and current ecological processes and vegetation patterns
Transportation Municipal, and Utilities	<ul style="list-style-type: none"> • Where needed, develop measures such as wildlife fencing and associated underpasses or overpasses to reduce mortality risk; • Identify and map the location of "key linkage areas" where highway crossings may be needed to provide habitat connectivity and reduce mortality of lynx; • Within the range of lynx, complete a biological assessment for all proposed highway projects on Federal lands; • Dirt and gravel roads traversing lynx habitat should not be paved or otherwise upgraded in a manner that is likely to lead to significant increases in traffic volumes, traffic speeds, increased width of the cleared right-of-way, or would foreseeably contribute to development of increases in human activity in lynx habitat.
Mining	Not addressed in LCAS.

1.5 STRUCTURE OF REPORT

35. This remainder of this report is organized as follows:

- Section 2: Background;
- Section 3: Timber Activities;
- Section 4: Development;
- Section 5: Recreation;
- Section 6: Public Lands Management and Conservation Planning;
- Section 7: Transportation, Utilities, and Municipal Activities;
- Section 8: Mining;
- Section 9: Tribal Activities;
- References;
- Appendix A: Consultation Costs;

- Appendix B: Summary of the Defenders of Wildlife Lynx Critical Habitat Analysis;
- Appendix C: Small Business and Energy Impacts Analysis;
- Appendix D: Timber Impacts Technical Appendix;
- Appendix E: Recreation Benefits Transfer Appendix; and
- Appendix F: Detailed Impacts by Activity and Subunit.