RECOVERY IMPLEMENTATION STRATEGY FOR THE CONTIGUOUS UNITED STATES DISTINCT POPULATION SEGMENT OF CANADA LYNX (*Lynx canadensis*)

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Disclaimer

The U.S. Fish and Wildlife Service's Canada Lynx team developed this recovery implementation strategy (RIS) to supplement the recovery plan for the Contiguous United States Distinct Population Segment (DPS) of Canada lynx (*Lynx canadensis*) (U.S. Fish and Wildlife Service (Service) 2024, entire). The team looks forward to collaborating with conservation partners and stakeholders to further refine and develop the RIS, so that it may best serve as an operational plan for conservation.

The RIS describes in greater detail how recovery actions are further refined into recovery activities for implementation. The RIS may be revised at any time during the recovery process, whenever experience and information gained call for a change in tactics, therefore maximizing flexibility of recovery implementation. Recovery "Actions" are broad measures that clearly describe what needs to be done to accomplish the goal of long-term viability as described in the recovery plan. "Activities" are the detailed, on-the-ground measures needed to implement the higher-level recovery actions. "Partners" include a variety of conservation partners who may engage in activities in varying degrees, from providing supporting information or tools to leading organization and implementation. Because this may vary by region and throughout the life of an activity, we do not always specify who may take lead of any given activity.

This RIS is an advisory document, not a regulatory document. It does not obligate parties to implement the recommended activities contained within it and may not represent the view nor the official position or approval of any individuals or agencies identified in the document, other than the U.S. Fish and Wildlife Service (Service). This RIS provides guidance for implementing recovery activities to carry out recovery actions identified in the Recovery Plan for the lynx DPS (Service 2024, entire).

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This recovery implementation strategy and its associated documents can be downloaded from the U.S. Fish and Wildlife Service's website: *https://ecos.fws.gov/ecp/species/3652.*

Recovery Actions and Activities

In this section we identify the recovery activities associated with the recovery actions from the Recovery Plan for the Contiguous United States Distinct Population Segment (DPS) of Canada lynx (Service 2024, entire). The following is a list of prioritized recovery actions, including site-specific management actions, that when fully implemented are expected to achieve recovery criteria and result in recovery of the Canada lynx DPS as defined in the recovery plan (Service 2024, entire). Priority 1 actions and their associated activities are based on currently available information that suggests those actions must be taken to prevent extinction or to prevent the DPS from declining irreversibly in the foreseeable future. Priority 2 actions are those that must be taken to prevent a significant decline in population size or habitat quality or some other significant negative impact. Priority 3 actions are all other actions necessary to provide for full recovery of the species. The assignment of priorities does not imply that some recovery actions are of low importance but recognizes that lower-priority items may be deferred while higher-priority items are being implemented. This RIS contains the activities, or specific tasks, required to implement these recovery actions.

The recovery plan identifies 16 recovery actions, which are repeated here, with the associated list of recovery activities (e.g., 1-1, 1-2, 1-3, etc.) for each recovery action. Please see the recovery plan for the Canada lynx DPS for additional information, including the recovery criteria and additional definitions (Service 2024, entire):

Priority 1 Actions and Activities

1. Work with Federal, state and tribal partners and private landowners to manage forests using the best available science to conserve, improve, or restore Canada lynx and snowshoe hare habitat within each SSA unit (Recovery Criteria 1, 2, 3, 4).

    1-1. Identify (via GIS analyses, LIDAR, and ground truthing) and conserve through forest management practices the habitats capable of supporting lynx survival, reproduction, and recruitment, specifically mature multistoried and regenerating conifer forests that support dense horizontal cover and abundant snowshoe hares.

    1-2. Evaluate the feasibility of mapping locally appropriate sub-unit analysis areas (e.g., Lynx Analysis Units) that can be used to assess habitat abundance and desired vegetation structural mosaics. Use the best available information to determine the desired vegetation structural mosaics needed to support reproduction within these sub-unit areas and identify goals for the number of sub-units needed within each SSA unit to meet the identified target vegetation structural stages to meet the population goals for each SSA unit. Develop an objective assessment method to evaluate the number of sub-units that meet the target vegetation structural stages every 5 years.

    1-3. On lands identified as important for lynx within SSA units, work with Federal, state, tribal, and private commercial timber partners to ensure that all existing and future land management plans, habitat conservation plans, other conservation efforts, and timber management strategies incorporate commitments to manage for habitat

conditions that support lynx survival, reproduction, and population viability, including protection of high-quality habitats.

1-4. Work with partners to use financial incentives or other methods (e.g., educational materials outlining benefits to landowner) to promote silvicultural techniques that maintain, improve, or restore lynx habitat on state, tribal, privately owned, and commercial forest lands identified as important to lynx conservation.

1-5. Identify and manage suboptimal habitats (e.g., stand initiation, stem exclusion, stands lacking dense horizontal cover) that could be improved through silviculture or prescribed fire to facilitate attainment and retention of high-quality habitat.

1-6. Evaluate the potential of various silvicultural techniques and timber harvest/management strategies to conserve, restore, create, or maintain mosaics of high-quality lynx habitat capable of supporting resident breeding populations over time.

1-7. Work with the U.S. Forest Service (USFS) to provide appropriate access through national forest lands where necessary for state, county, tribal, and private commercial timber partners for the purposes of applying forest management practices supportive of lynx habitat.

2. Develop and implement tools to identify and monitor the quantity and distribution of lynx habitat in all SSA units (Recovery Criteria 2, 3).

3. Conduct research and monitoring to develop and implement proactive forest management strategies to improve the resiliency of lynx habitat in each SSA unit given projected impacts of climate change within the DPS (Recovery Criteria 1, 2, 3, 4).

3-1. Map and quantify fire impacts in all SSA units annually and summarize impacts every 5 years.

3-2. Identify lynx habitats (e.g., mature multistory forests) and potential connectivity corridors that should be protected from large wildfires to the extent practicable.

3-3. Identify areas most vulnerable to large stand-replacing fires and implement strategies to reduce the risk of burning or reburning or conversion to non-forest.

3-4. Work with land managers to develop local treatment plans to reduce fuels and reduce the likelihood of large wildfires while minimizing effects to existing high-quality lynx habitat.

3-5. Work with Federal, state, tribal, and private commercial timber partners to ensure that land management plans, habitat conservation plans, timber management strategies and other conservation efforts to address a comprehensive fuels and fire management strategy that incorporates lynx habitat needs.

3-6. Incorporate fire management plans in lynx conservation strategies (e.g., Lynx Conservation Assessment Strategy) and identify silvicultural techniques needed to create a resilient mosaic of forest structure and reduce frequency of large fire events.

3-7. Monitor lynx response to wildfires and prioritize habitat restoration efforts within burned areas to accelerate the return of lynx use to these areas.

3-8. Continue research/monitoring on how climate affects spruce budworm outbreaks.

3-9. Continue research/monitoring on how climate change affects tree species distribution.

3-10. Work with USFS to facilitate appropriate access and use of existing or temporary roads for the purpose of fuel and fire management to improve habitat resilience and mitigate wildfire impacts in lynx habitats.

3-11. Evaluate the effectiveness of all management and conservation efforts aimed at reducing threats to lynx populations and/or habitats.

4. Maintain or enhance connectivity between lynx habitats in SSA Units 1–4 and adjacent lynx habitats north of the U.S.-Canada border (Recovery Criteria 1, 2).

4-1. Map and quantify the extent and contiguity of existing forested habitat within 100 kilometers on each side of the U.S.-Canada border where SSA units are adjacent to the border.

4-2. Monitor changes in the amount and distribution of forested habitat along the U.S.-Canada border; remap and re-quantify habitat connectivity every 5 years for 20 years. Work with states, Canadian forest managers, commercial timber producers and U.S. Forest Service to identify, conserve, or enhance important dispersal corridors.

4-3. Work with Canadian resource management agencies to evaluate the effectiveness of current lynx management and conservation efforts in southern Canadian provinces adjacent to SSA Units 1, 2, 3, and 4.

4-4. Monitor lynx populations and habitat in southern Canadian provinces.

4-5. Monitor human-caused mortality levels and the effects of Canada lynx recreational and commercial harvest in southern Canadian provinces.

5. Maintain or enhance connectivity within the DPS to facilitate lynx dispersal between SSA units 3 and 5 and between SSA units 5 and 6 (Recovery Criteria 1, 2).

5-1. Work with the USFS, BLM, states, tribes and other land managers, as needed, to implement habitat management and conservation strategies for Tier 2 and Tier 3 habitat polygons identified in the Western Lynx Biology Team 2022 Framework to enhance connectivity.

5-2. Evaluate habitat conditions in Tier 2 and Tier 3 habitats every 5 years for 20 years.

6. Ensure long-term protections for lynx and their habitat are in place in all SSA units (Recovery Criterion 4).

6-1. Work with Federal partners to complete Memorandums of Understandings (MOUs), conservation agreements, or other collaborative tools to maintain and refine regulatory mechanisms to ensure the long-term conservation of lynx habitats and populations.

6-2. Work with state, county, tribal, private, and commercial landowners to develop and implement collaborative conservation measures and incentives to promote long-term lynx habitat conservation.

7. Identify and conserve potential climate refugia habitats for lynx in each SSA unit (Recovery Criterion 3).

    7-1. Develop models to identify finer scale lynx micro-habitat use as well as climatically resilient areas within SSA units and surrounding areas, and continually update these models based on best available information, ground truthing and other data.

    7-2. Conserve/restore/improve habitats identified as potential climate refugia habitats (i.e., those areas modeled to retain favorable temperature conditions longest in a warming future).

    7-3. Evaluate need, and if warranted, augment lynx populations in climate refugia (i.e., SSA unit 6) or translocate lynx to unoccupied refugia (i.e., SSA unit 5) to establish populations.

8. Continue monitoring lynx abundance and distribution for each DPS population (Recovery Criterion 1).

    8-1. Continue snowtrack surveys in occupied areas using DNA verification (backtracking to collect hair, scat or environmental DNA).
    8-2. Conduct snowtrack surveys in areas believed to be unoccupied that contain potentially suitable habitat.
    8-3. Optimize information extraction from existing DNA databases to refine understanding of multiple population parameters (i.e., recruitment, immigration, genetic relatedness, etc.).

9. Monitor genetic diversity in each DPS population to evaluate genetic health and detect genetic evidence of functional connectivity between DPS and Canadian populations (Recovery Criterion 3).

10. Develop new or refine existing techniques to improve and standardize monitoring to detect population trends and changes, derive reliable population size estimates, and refine understanding of the distribution of DPS populations (Recovery Criterion 1).

    10-1. Develop, and test standardized, statistically robust *population size estimators* capable of detecting biologically meaningful population fluctuations and trends that can be applied across all DPS populations.

    10-2. Develop, test, and implement monitoring systems (genetics or other techniques) to detect immigration/emigration and utilize this monitoring system across all SSA units.

    10-3. Develop, standardize, and implement methods for detecting and quantifying reproduction, recruitment, and mortality rates across all DPS populations.

10-4. Develop, standardize, and implement methods for estimating population growth rate (lambda; λ) for all DPS populations.

10-5. Standardize survey protocols and occupancy estimators to detect changes/ contraction in distribution of resident lynx.

10-6. Develop species distribution models for the Northeast and the Midwest focusing on resident lynx (replicating Olson *et al*. 2021) to refine our understanding of lynx habitat requirements and distribution of habitats capable of supporting lynx.

Priority 2 Actions and Activities

11. Identify and implement conservation actions if monitoring in Action 8 and Action 9 indicates demographic or genetic trends that require intervention to prevent extirpation, which could include localized population augmentations or re-introductions as determined by feasibility assessments developed in collaboration with Federal, state, and tribal partners (Recovery Criterion 1).

    11-1. Monitor genetic health in all SSA units, and create a genetic management plan, if deemed appropriate, across SSA units, as needed.

    11-2. Evaluate lynx population trends and distribution (see Action 1), genetic health, and the potential benefits and feasibility of a potential, localized population augmentation program for Canada lynx populations in each SSA unit, as needed.

    11-3. If populations are trending down and intervention is deemed necessary, develop and implement appropriate conservation actions, which could include localized population augmentation programs, in coordination with all stakeholders, as needed.

12. Minimize sources of human-caused mortality, particularly vehicle collisions and incidental trapping or hunting mortality (including mistaken identity) in each SSA unit (Recovery Criteria 1, 4).

    12-1. Evaluate the relative influence of human caused mortality on population viability within each SSA unit.

    12-2. Work with appropriate state and Federal agencies to minimize or mitigate impacts to lynx from new highway development in lynx habitat.

    12-3. Increase awareness among vehicle (car and snowmachine) operators in areas of lynx presence of potential for collisions.

    12-4. Monitor development of new motorized trails for recreational vehicles and levels of use.

    12-5. Continue to work with state and tribal furbearer/hunting managers to refine and ensure implementation of measures to limit incidental take from trapping/hunting. Examples

may include improving hunter/trapper education programs, Habitat Conservation Plans with state agencies, or trapping prohibitions or restrictions.

13. Conduct research to further refine understanding of climatic conditions that support lynx populations in each SSA unit (Recovery Criterion 1).

    13-1. Evaluate relationship between lynx demography (e.g., occupancy, survival, reproduction, and recruitment) and modeled warmer and colder temperatures.

    13-2. Conduct radio telemetry studies of lynx that occur inside versus outside of modeled suitable temperature envelopes (i.e., -15 to -10°C, versus -10 to -5°C in SSA units 1 and 2; -10 to -5°C versus -5 to 0°C in SSA units 3–6) (Service 2023, chapter 6.1).

    13-3. Establish long term monitoring plots within and outside modeled suitable temperature ranges to compare current and future vegetative characteristics; snow depth, duration, and condition; snowshoe hare abundance; and presence of potential competitors.

14. Develop strategies to promote snowshoe hare habitat and populations in areas adjacent to and between SSA units to facilitate connectivity and dispersal (Recovery Criterion 3).

    Activities to be determined in RIS workshops.

Priority 3 Actions and Activities

15. Work with partners to improve understanding of the influence of disease, competition, predation, and hybridization on DPS populations (Recovery Criterion 1).

    15-1. Work with partners to track the spread of rabbit hemorrhagic disease (RHDV2) and outbreaks of avian influenza to determine if snowshoe hare or lynx populations become infected.

    15-2. Work with partners to track changes in the abundance and distribution of potential lynx competitors (e.g., bobcat and coyotes) and predators (e.g., mountain lions and fisher).

    15-3. Work with state agencies to develop strategies to reduce competition, predation, or hybridization pressures where necessary to meet Recovery Criterion 1.

    15-4. Explore feasibility of bobcat management program if competition is determined to be an increasing threat.

    15-5. Explore feasibility of and need for propagation and supplemental snowshoe hare feeding program for Canada lynx.

    15-6. Work with partners to continue collection and analysis of lynx genetic samples to track potential changes in hybridization rates.

16. Work with partners to evaluate the potential need for and feasibility of translocating lynx into SSA Unit 5 focal areas, which may serve as a climate refugium (Recovery Criterion 1).

16-1. If needed, the Service would host virtual expert workshops to explore need and feasibility of translocation program for Canada lynx in SSA unit 5.

16-2. Conduct habitat and snowshoe hare surveys in SSA unit 5 to determine if it could support a resident population.

16-3. Model suitable microhabitats (climate refugia) in SSA unit 5 to determine habitat capability to support long-term viability of a translocated population.

16-4. If conditions are suitable and intervention is deemed necessary, and in coordination with all stakeholders, develop a lynx translocation program to translocate lynx from Canada and Alaska to try to establish a resident population greater than 25 lynx in the SSA unit 5 focal area.

Literature Cited

U.S. Fish and Wildlife Service. 2024. Recovery plan for the contiguous United States distinct population segment of Canada lynx (*Lynx canadensis*). December 2024. U.S. Fish and Wildlife Service, Mountain-Prairie Region, Denver, Colorado. 39 pp.