

# Menu of Adaptation Strategies and Approaches

## Developed for Wildlife Management

### Adaptation Strategies for Population Management

#### Strategy 1: Maintain and enhance genetic diversity.

- 1.1. Increase genetic exchange between populations.
- 1.2. Maintain and enhance genetic admixture (interbreeding) zones in order to facilitate adaptive genetic exchange
- 1.3. Limit genetic exchange to protect isolated populations.
- 1.4. Prioritize conservation of trailing edge or leading-edge populations.
- 1.5. Maintain populations in disturbed environments because they may contain adaptive traits.
- 1.6. Protect areas of high phylogenetic or phenotypic diversity or endemism.
- 1.7. Translocate individuals with climate-adaptive genetic traits.
- 1.8. Preserve genetic material (gene banks).
- 1.9. Restore genetic diversity in isolated or inbred populations (genetic rescue).

#### Strategy 2: Establish and maintain connectivity between populations.

- 2.1. Translocate individuals or populations to habitat within the existing range that was formerly occupied and remains suitable (reintroduction).
- 2.2. Identify and protect source sub-populations.
- 2.3. Establish and maintain connectivity between sub-populations through corridors or stepping stones.

#### Strategy 3: Maintain, restore, and manage coastal vegetation.

- 3.1. Establish corridors and minimize barriers to movement to new suitable habitats.
- 3.2. Prepare suitable habitat in anticipation of future introduction, reintroduction, or natural range shift of a species.
- 3.3. Move and release individuals into a population where conditions are now suitable and are expected to improve.
- 3.4. Reintroduce species where climate is expected to remain suitable.
- 3.5. Conserve leading-edge populations (high altitude, northern, etc.).
- 3.6. Introduce species to new areas with suitable current and future climate.

#### Strategy 4: Manage interspecific and biotic interactions.

- 4.1. Increase or protect existing biodiversity, for example species richness, functional diversity, and phylogenetic diversity.
- 4.2. Detect and remove non-native invasive species.
- 4.3. Manage predator populations.
- 4.4. Restore historic trophic linkages.
- 4.5. Maintain functional groups or keystone species that help sustain ecosystem functions.
- 4.6. Reintroduce extirpated species or functional groups.
- 4.7. Manage extant and emerging diseases.

#### Strategy 5: Maintain a sustainable population size by managing reproduction, survival, and dispersal.

- 5.1. Move and attract individuals to augment an existing population.
- 5.2. Increase reproduction and survival rates.
- 5.3. Use captive breeding programs to increase populations of declining or rare species.
- 5.4. Manage natural predation to increase populations of declining or rare species.
- 5.5. Control take, harvest, and illegal harvest.

#### Strategy 6: Adjust harvest regulations to manipulate populations of harvested species.

- 6.1. Adjust harvest regulations to increase population size for declining species or species anticipated to be impacted by climate change.
- 6.2. Adjust harvest regulations to decrease population size.
- 6.3. Adjust harvest regulations to facilitate shifting phenology or species ranges.

#### Strategy 7: Plan for and reduce human disturbance and human-wildlife conflict.

- 7.1. Anticipate and manage conflict from increasing populations, range expansions, or changing behaviors.
- 7.2. Manage conflict associated with societal adaptations to climate change.
- 7.3. Reduce or limit access to sensitive habitats or environments.
- 7.4. Reduce or remove human disturbance stress during sensitive time periods.
- 7.5. Implement nonlethal behavioral control methods (barriers and deterrents).

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# Adaptation Strategies for Habitat Management

## Strategy 8: Restore and maintain sources of food, water, and cover as components of habitat.

- 8.1. Manage for plant species diversity and complexity.
- 8.2. Promote plant genetic diversity.
- 8.3. Prioritize native vegetation and suitable site conditions for habitat management and restoration.
- 8.4. Manage and create suitable microhabitats and microclimates.
- 8.5. Enhance primary food sources for specialist climate-sensitive species.
- 8.6. Provide supplemental food sources.
- 8.7. Create or maintain sources of food, water, and cover in a variety of locations across the landscape.
- 8.8. Maintain or mimic natural disturbance regimes to enhance habitat quality.

## Strategy 9: Adjust management of food, water, and cover to align with expected future conditions.

- 9.1. Use non-local, future-adapted genotypes in habitat management.
- 9.2. Create new sources of food, water, and cover in anticipation of future conditions.
- 9.3. Accommodate altered hydrology, accounting for periods of high water and low water availability.
- 9.4. Maintain or enhance sources of food, water, and cover across the annual cycle and different life stages in response to changing phenology.
- 9.5. Establish or redesign infrastructure to protect habitat from anticipated climate impacts.

## Strategy 10: Establish and enhance protected areas or habitat reserves.

- 10.1. Create large, intact, or aggregated protected areas.
- 10.2. Increase representation and replication of protected species and habitats across the portfolio of protected areas.
- 10.3. Select reserves that maximize biodiversity protection for a suite of species.
- 10.4. Orient suites of protected areas in ways that span gradients in climate.
- 10.5. Create protected areas that maximize topographic and geologic variety.
- 10.6. Protect areas at high risk of change due to climate or land use change.
- 10.7. Protect climate refugia across the landscape.
- 10.8. Protect sites that are expected to provide future suitable habitat.
- 10.9. Protect stepping stones, adjacent reserves, and corridors.

- 10.10. Create temporary or dynamic reserves.
- 10.11. Maintain or enhance habitat across the annual cycle and life stages.
- 10.12. Protect current safe havens for climate vulnerable populations to ensure those populations are available for future conservation efforts.
- 10.13. Protect sufficient habitat for viable populations to be self-sustaining and of sufficient quality to create surplus dispersers.

## Strategy 11: Promote wildlife habitat conservation on lands outside of protected areas.

- 11.1. Identify and restore degraded landscapes with high potential habitat quality.
- 11.2. Reduce or limit barriers to wildlife movement across private land.
- 11.3. Manage private lands near and between protected lands (buffer zones).
- 11.4. Enhance green infrastructure and promote sustainable urban landscapes.
- 11.5. Manage public or private agricultural land to provide compatible wildlife use.
- 11.6. Manage forest structure to provide compatible wildlife use areas.

## Additional Adaptation Strategies

### Strategy 12: Intentionally choose to take no action.

- 12.1. Take no action in some situations as part of an overall triage strategy.
- 12.2. Designate no action areas as a control to compare with management interventions.
- 12.3. Allow for autonomous, or unassisted, adaptation to climate change.

### Strategy 13: Engage human communities in wildlife conservation.

- 13.1. Develop outreach and technical assistance programs for the public.
- 13.2. Provide access for wildlife-dependent recreation.
- 13.3. Increase local community involvement in wildlife management.
- 13.4. Promote community-managed conservation lands.
- 13.5. Respect and incorporate landscape values of indigenous communities in management decisions.
- 13.6. Pay for ecosystem services that also benefit wildlife.
- 13.7. Coordinate across landowners and scales to make sure programs are complementary.

**MORE INFORMATION:** This menu of adaptation strategies and approaches can be used within the Adaptation Workbook decision-support framework found in Swanston, C.W.; Janowiak, M.K.; Brandt, L. A.; Butler, P.R.; Handler, S. D.; Shannon, P.D.; Derby Lewis, A.; Hall, K.; Fahey, R.T.; Scott, L.; Kerber, A.; Miesbauer, J.W.; Darling, L.; Parker, L.; St. Pierre, M. 2016. **Forest adaptation resources: climate change tools and approaches for land managers, 2nd ed.** Gen. Tech. Rep. NRS-GTR-87-2. Newtown Square, PA: U.S. Department of Agriculture, Forest Service, Northern Research Station. 161 p. [doi.org/10.2737/NRS-GTR-87-2](https://doi.org/10.2737/NRS-GTR-87-2).

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