

# Menu of Adaptation Strategies and Approaches

## *Developed for wildlife management*

### *Adaptation Strategies for **Population** Management*

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

##### Approaches

- 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.**

##### Approaches

- 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: Facilitate shifts in the geographic range of the species in anticipation of future conditions.**

##### Approaches

- 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.**

##### Approaches

- 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

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

##### Approaches

- 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.**

##### Approaches

- 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.**

##### Approaches

- 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 (coastline hardening, land-use changes, etc.)
- 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.**

##### Approaches

- 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.**

##### Approaches

- 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.**

##### Approaches

- 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

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### *Adaptation Strategies for **Habitat** Management*

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

##### Approaches

- 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

### *Additional Adaptation Strategies*

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

##### Approaches

- 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.**

##### Approaches

- 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



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**More information:** [www.forestadaptation.org/wildlife](http://www.forestadaptation.org/wildlife) or contact Stephen Handler ([stephen.handler@usda.gov](mailto:stephen.handler@usda.gov))

This menu is supplemental resource to be used with the Adaptation Workbook decision-support framework (Swanston et al, 2016. *Forest Adaptation Resources: climate change tools and approaches for land managers*, 2nd edition. <http://www.treearch.fs.fed.us/pubs/52760>). **More information:** [www.forestadaptation.org/strategies](http://www.forestadaptation.org/strategies)