

# Bear River Climate Change Adaptation Workshop

## Definitions

1. **Adaptation to climate change:** An adjustment in natural systems in response to a changing climate in order to moderate adverse impacts or capitalize on novel opportunities (IPCC 2007). Adaptation involves anticipating the influence of climate change and using this information to make proactive choices to achieve objectives.
2. **Adaptive capacity:** The ability of a system to adjust, to moderate, to take advantage of, or cope with novel conditions (IPCC 2000). Enhancement of an ecosystem's adaptive capacity reduces the system's vulnerability and/or strengthens its ecological resilience through management or mitigation.
3. **Adaptive strategies:** Actions to take to build resistance build resilience or facilitate the response of natural features to change. For example, improvement in habitat connectivity enables species populations to move to more suitable habitats as the climate changes.
4. **Climate change impacts (hypotheses of change):** Hypotheses or assumptions about how climate change will affect conservation features and their ecological attributes (e.g., *significantly reduced snow pack will alter the spring and summer hydrologic flow regime for a riparian ecosystem*).
5. **Climate projection:** A *projection* of the response of the *climate system* to *emission or concentration scenarios* of *greenhouse gases and aerosols*, or *radiative forcing* scenarios, often based upon simulations by *climate models*. Climate projections are distinguished from *climate predictions* in order to emphasize that climate projections depend upon the emission/concentration/ radiative forcing scenario used, which are based on assumptions concerning, e.g., future socioeconomic and technological developments that may or may not be realized and are therefore subject to substantial *uncertainty* (IPCC 2007).
6. **Climate system:** The climate system is the highly complex system consisting of five major components: the *atmosphere*, the *hydrosphere*, the *cryosphere*, the land surface and the *biosphere*, and the interactions between them. The climate system evolves in time under the influence of its own internal dynamics and because of *external forcings* such as volcanic eruptions, solar variations and *anthropogenic forcings* such as the changing composition of the atmosphere and *land use change*. (IPCC 2007).
7. **Conceptual ecological model:** Illustration of the climatic, ecological, social and economic factors that affect a selected species or ecosystem. It is a box and arrow diagram that represents relationships, helping planners and managers to understand and communicate impacts of climate change on conservation features.
8. **Downscaling:** Downscaling is a method that derives local- to regional-scale (10 to 100 km) information from larger-scale models or data analyses. Two main methods are distinguished: *dynamical downscaling* and *empirical/statistical downscaling*. The dynamical method uses the output of regional *climate models*, global models with variable spatial resolution or high-resolution global models. The empirical/statistical methods develop statistical relationships that link the large-scale atmospheric variables with local/regional climate variables. The quality of the downscaled product depends on the quality of the driving model (IPCC 2007).
9. **Driver:** An environmental factor that causes a change in an organism, community, ecosystem, or other ecological component of the landscape.

10. **Ensemble:** A group of parallel model simulations used for *climate projections*. Variation of the results across the ensemble members gives an estimate of *uncertainty*. Ensembles made with the same model but different initial conditions only characterize the uncertainty associated with internal *climate variability*, whereas multi-model ensembles including simulations by several models also include the impact of model differences. (IPCC, 2007)
11. **Exposure:** The degree, duration, and/or extent to which a system is in contact with a climatic or other environmental perturbation, often depicted by analysis of historic climate or climate projection data (such as changes in temperature and precipitation).
12. **Feasibility:** Capability of a strategy being implemented, considering ease of implementation, availability of an experienced lead person, institutional support, ability to motivate key constituencies, and ability to secure necessary funds.
13. **Intervention points:** Places in the system that we can influence through management and conservation actions, e.g., *grazing management or invasive species management*.
14. **Mitigation:** A human intervention to reduce the *sources* or enhance the *sinks* of *greenhouse gases* (IPCC 2007).
15. **Objective:** Biological outcomes we are trying to achieve. Quantitative and measurable statement of success for a conservation feature based on its viability or threat reduction, e.g.: *By 2025 ensure good base-flows in summer so that no sections of the Blue River go dry (50-75 CFS) in dry years*.
16. **Refugia:** Physical environments that are less affected by climate change than other areas and thus offer a refuge from climate change.
17. **Resilience:** Degree to which a system rebounds, recoups or recovers from a disturbance or stimulus. An example of a resilience strategy is to restore riparian areas along streams experiencing increased intensity of drought, helping to maintain water quantity and quality.
18. **Resistance:** Degree to which an ecosystem can resist the influence of climate change and forestall its undesirable effects (adapted from Millar et al. 2007), e.g., *reduce effects of climate change for animals by improving their ability to migrate by creating large management units and broad corridors* (Joyce et al. 2009).
19. **Sensitivity:** Degree to which a system or species is affected by or responsive to climate change.
20. **Strategic actions:** Actions necessary to address the most important impacts of climate change or human responses, e.g., *aggressively manage snowpack with snow fences, cover and shade of snowpack/drifts, or windbreaks*.

21. **Uncertainty:** The degree to which a value (e.g., the future state of the *climate system*) is unknown. Uncertainty can result from lack of information or from disagreement about what is known or even knowable. It may have many types of sources, from quantifiable errors in the data to ambiguously defined concepts or terminology, or uncertain *projections* of human behavior. Where uncertainty in specific outcomes is expressed (as in Table 1), the following likelihood ranges are used to express the assessed probability of occurrence (IPCC 2007):

- virtually certain >99%;
- extremely likely >95%;
- very likely >90%;
- likely >66%;
- more likely than not > 50%;
- about as likely as not 33% to 66%;
- unlikely <33%;
- very unlikely <10%;
- extremely unlikely <5%;
- exceptionally unlikely <1%.

Where uncertainty is assessed more quantitatively then the following scale of confidence levels is used to express the assessed chance of a finding being correct:

- very high confidence at least 9 out of 10;
- high confidence about 8 out of 10;
- medium confidence about 5 out of 10;
- low confidence about 2 out of 10; and
- very low confidence less than 1 out of 10.

22. **Vulnerability:** the degree to which a system is susceptible to and unable to cope with adverse effects of climate change, including climate variability and extremes (IPCC 2007). Vulnerability is a function of exposure, sensitivity, and adaptive capacity.