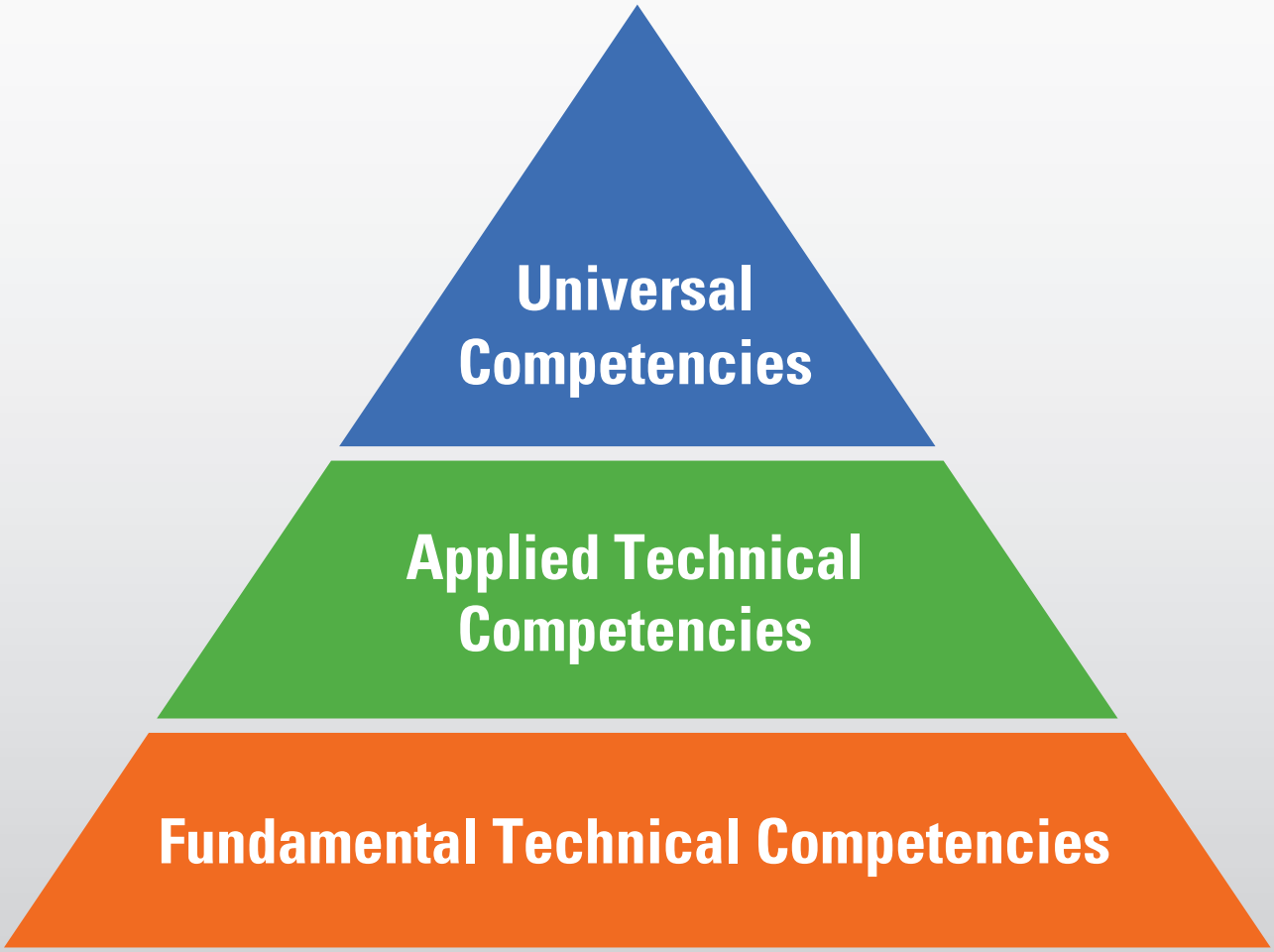
U.S. Fish & Wildlife Service

National Conservation Training Center

Climate Change Response Competency Model And Developmental Framework



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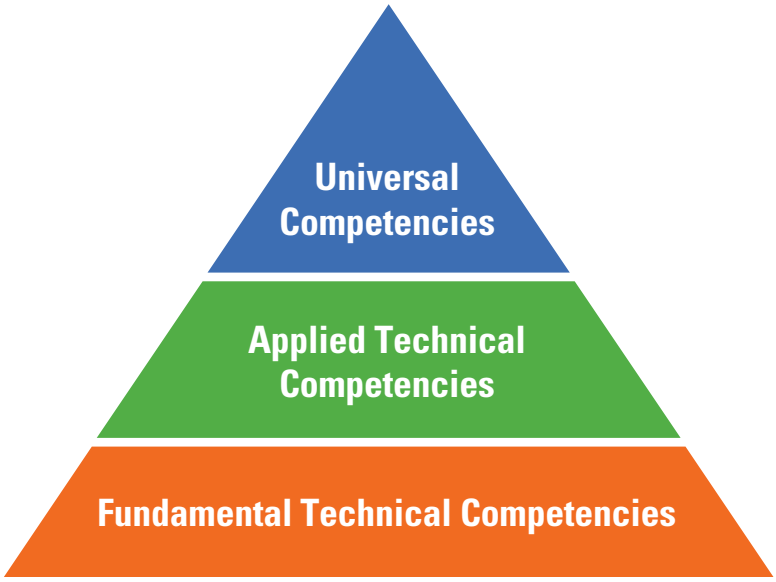


Addressing impacts associated with climate change is the primary conservation challenge facing the U.S. Fish and Wildlife Service (USFWS) and other agencies responsible for conserving the Nation's lands and waters. In October 2021 the Service released the Climate Change Action Program (CCAP) that "unites efforts to accelerate our response to the impacts of climate change on the country's natural resources." At the same time, the Department of the Interior produced the Climate Adaptation and Resilience Plan (CARP) which directs all bureaus to"…use science as the foundation for planning and decision-making related to climate change risks, impacts and vulnerabilities."

One of the elements of the CCAP states that we shall "develop a climate literate workforce that has the knowledge, skills, and abilities to successfully address climate adaptation and mitigation needs throughout all programs and regions of regions of the USFWS." This Climate Change Response Competency Model (Model) presents 23 competencies necessary to build capacity for integrating climate adaptation into policy, planning and operations. They fall into three categories:

- **Fundamental Technical Competencies which are those that encompass the specific abilities necessary to respond to climate change.**
- **Applied Technical Competencies that are used by practitioners to manage the resources for which they are responsible.**
- **Universal Competencies are skills, behaviors and attributes considered valuable and applicable across a wide range of roles. Those selected here contribute to an individual's overall effectiveness for making decisions and leading others through the climate change response process.**

The purpose of this Model is to help employees identify the knowledge and skills needed to integrate climate change response into their work. Because responding to climate change falls on all USFWS employees, this Model applies to a broad range of occupational series and USFWS programs and covers areas from basic awareness to advanced topics. Individual USFWS staff can work with their supervisor to self-assess their proficiency level in each of the competencies and then identify those areas where increased proficiency is needed.

Following the Model we provide a Developmental Framework (Framework) of training and other resources that address each competency. We did not limit ourselves to courses at the National Conservation Training Center (NCTC), and have included courses from other federal agencies, conservation organizations and the private sector. We've provided such a broad array in the hopes that those using the guide can find the training that may be more timely and best fits into their busy schedules. The course offerings listed in the framework portion of the document can assist USFWS staff and their supervisors to identify training to be added to the annual Individual Development Plan (IDP) process. These courses are current as of September 2023. For courses delivered by Department of the Interior (DOI) agencies, please check DOI Talent for availability status. A DOI Climate Change Training Inventory SharePoint site is currently under development and will also be a valuable resource for finding available courses.

The Model and Framework is a living resource that can be used as both a training guide and an employee development tool by all USFWS employees.

A list of acronyms is provided on page 20.

The Competencies

Fundamental Technical Competencies	Applied Technical Competencies	Universal Competencies
Climate Science *	Climate Change Scenario Planning	Decision Making [1]
Climate Change Impacts	Planning for Uncertainty *	Climate Communication
Ecological Transformation *	Public Planning [1]	Build Strong Partnerships [2]
Climate Change Mitigation *	Monitoring, Evaluation and Adaptive Management	Maximize Co-Benefits [2]
Climate Change Vulnerability	Downscaling and Application of Climate Models	Environmental Justice and Equity [2]
Climate Change Risk	Use of Best-Available Science and Traditional Knowledge [2]	Systems Thinking
Climate Change Resilience	Apply Nature-Based Solutions and Ecosystem-Based Approaches [2]	Change Management [1]
Climate Change Adaptation *		Mainstream Adaptation [2]

Some of the Fundamental and Applied Technical Competencies are derived from the many facets of science related to climate change response (those without superscripts). Note that five of these (*) are new competencies written for inclusion in the DOI Competency Dictionary (none previously existed).

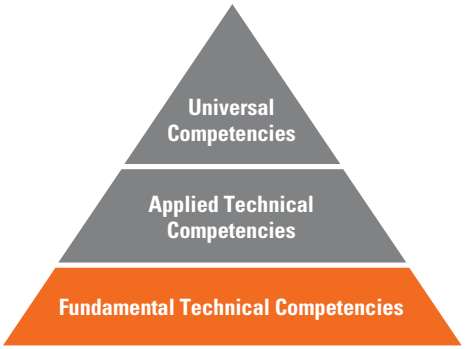
Additional Competencies in the Applied Technical and Universal categories were derived from a variety of sources, including:

1) The *DOI Competency Dictionary;*

2) The "Institutional Approaches" specified in the 2021 *Department of the Interior Climate Adaptation and Resilience Plan (DOI* CARP);

Because individual competencies cannot stand alone, we have cross-walked this list with the DOI Competency Dictionary to illustrate interconnections. We have also related each competency to the Institutional Approaches listed in the CARP.

The Competency Model



Fundamental Technical Competencies

CLIMATE SCIENCE:
Describes and investigates the concepts, principles, theories, and methods used to examine the interrelationships among the biosphere, hydrosphere, lithosphere, cryosphere, and atmosphere, including how and why they change over time.

Related competencies: Earth Science, Physical Science

DOI CARP Institutional Approach:
#6 – Enhance Climate Literacy

CLIMATE CHANGE IMPACTS:
Describes why and how climate variability and change impact ecosystems and the physical environment, and how those impacts affect human populations.

Related competencies: *Climate Science, Ecological Transformation*, Ecology

DOI CARP Institutional Approach:
#6 – Enhance Climate Literacy

ECOLOGICAL TRANSFORMATION:
Describes and investigates the concepts and principles of ecosystem transition to new and potentially irreversible states.

Related competencies: *Climate Science*, Ecology, Technical Competence & Technical Credibility in conjunction with a variety of professional competencies.

DOI CARP Institutional Approach:
#1 – Use Best Available Science and Traditional Knowledge

CLIMATE CHANGE MITIGATION:
Reduces the impact of climate change through actions such as lowering or preventing greenhouse gas emissions, strengthening ecosystem services, and reducing vulnerability of species and infrastructure.

Related Competencies: Climate Science, Ecological Transformation, Climate Change Mitigation, Planning for Uncertainty, Risk Management, Organizational Awareness.

DOI CARP Institutional Approach:
#8 – Apply Nature-Based Solutions and Ecosystem-Based Approaches

CLIMATE CHANGE VULNERABILITY:
Identifies which species or systems are likely to be most strongly affected by projected changes and understand why these resources are likely to be vulnerable. Identifies methods to decrease vulnerability by increasing adaptive capacity and reducing exposure and sensitivity. "The extent to which a species, habitat, ecosystem, cultural feature, facility, or other resource is susceptible to and unable to cope with direct and indirect impacts of climate change." (DOI CARP)

Related competencies: Climate Science, Ecological Transformation, Climate Change Adaptation, Vulnerabilities Assessment, Research, Research and Statistics.

DOI CARP Institutional Approach: Core topic, #1 – Apply Best-Available Science and Traditional Knowledge, #7 – Apply Risk Management Methods and #8 – Apply Nature-Based Solutions and Ecosystem-Based Approaches

CLIMATE CHANGE RISK:
Identifies and quantifies risks associated with climate change. "Using appropriate methods and tools to consider potential future climate conditions, adaptation costs, and prioritize options to reduce vulnerability to environmental, social and economic impacts of climate change." (DOI CARP). Recognition of uncertainty is also integral to dealing with risk.

Related competencies: *Climate Science*, Risk Management, Research and Statistics, Decision Analysis, Planning for Uncertainty

DOI CARP Institutional Approach:
#7 – Incorporate Risk Management

CLIMATE CHANGE RESILIENCE:
Understands what constitutes climate resilience and what means are available to improve resilience. "The ability to anticipate, prepare for, and adapt to changing conditions and withstand, respond to, and recover rapidly from disruptions." (DOI CARP)

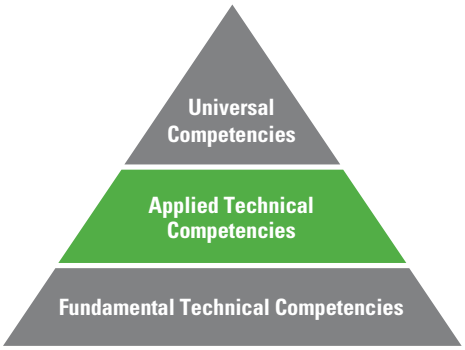
Related competencies: Climate Science, Ecological Transformation, Climate Change Adaptation, Research, Research and Statistics, Creative Thinking, Creativity, and Innovation

DOI CARP Institutional Approach: Core topic, #6 – Enhance Climate Literacy, and #8 – Apply Nature-Based Solutions and Ecosystem-Based Approaches

CLIMATE CHANGE ADAPTATION:
Responds to climate change using best available science and/or indigenous knowledge in planning and conservation efforts.

Related competencies: Climate Science, Ecological Transformation, Climate Change Adaptation, Planning for Uncertainty, Technical Competence & Technical Credibility in conjunction with natural resources/conservation professional competencies, Organizational Awareness, Decision Making.

DOI CARP Institutional Approach: Core topic and all nine Institutional Approaches



Applied Technical Competencies

CLIMATE CHANGE SCENARIO PLANNING:
Applies this decision support method for integrating irreducible and uncontrollable uncertainties into climate change adaptation. Identifies key climate sensitivities of resources, examine a range of relevant and plausible future conditions, and explores management options that can be effective across scenarios.

Related competencies: Climate Science, Ecological Transformation, Climate Change Adaptation, Technical Competence & Technical Credibility in conjunction with natural resources/conservation professional competencies, Process Improvement, Creative Thinking.

DOI CARP Institutional Approach:
#2 – Mainstream Adaptation

PLANNING FOR UNCERTAINTY -
Monitors and examines a range of relevant and plausible future conditions, recognizes uncertainty and risk, and explores management options that can be effective across scenarios by applying relevant concepts, principles, theories, and scientific methods.

Related competencies: Climate Science, Ecological Transformation, Climate Change Adaptation, Technical Competence & Technical Credibility in conjunction with natural resources/conservation professional competencies, Process Improvement, Creative Thinking.

DOI CARP Institutional Approach:
#2 – Mainstream Adaptation

PUBLIC PLANNING.
Knowledge of functions, principles, methods, and techniques of public planning, including those related to community planning, outdoor recreation planning, and natural resource management, such as demand forecasting, environmental impact analysis, financial forecasting, and land use planning and zoning. (This will address climate-related impacts to visitor experience, recreational opportunities, health, and safety.)

Related competencies: Organizational Awareness, External Awareness, Leveraging Diversity, Influencing/Negotiating, Vision, Stakeholder Engagement.

DOI CARP Institutional Approach:
#2 – Mainstream Adaptation and #9 – Apply Nature-Based Solutions and Ecosystem-Based Approaches

MONITORING, EVALUATION AND ADAPTIVE MANAGEMENT.
Applies these steps that are essential to track effectiveness of actions and provide guidance for needed adjustments when responding to climate change.

Related competencies: Planning for Uncertainty, Continual Learning, Technical Competence & Technical Credibility in conjunction with natural resources/conservation professional competencies, Research, Research and Statistics.

DOI CARP Institutional Approach:
#9 – Continuously Evaluate Performance and Practice Adaptive Management

DOWNSCALING AND APPLICATION OF CLIMATE MODELS.
Understands these processes for application to project-specific needs and appropriate scales. While USFWS practitioners do not necessarily need to actively create and downscale climate models, a working knowledge of them is needed to effectively interact with modeling professionals.

Related competencies: Climate Science, Ecological Transformation, Planning for Uncertainty, Continual Learning, Technical Competence & Technical Credibility in conjunction with natural resources/conservation professional competencies, Research, Research and Statistics

DOI CARP Institutional Approach:
#6 – Enhance Climate Literacy

USE OF BEST AVAILABLE SCIENCE AND TRADITIONAL KNOWLEDGE.
Uses the best-available information for planning and decision making that considers existing and projected climate change vulnerabilities, risks, and impacts. The most effective science will work in co-production with the management community to provide integrated multiscale science outputs to inform decisions. Decision-making will also consider traditional knowledge with meaningful engagement with Tribes and other indigenous communities throughout decision-making processes that affect their interests.

Related competencies: Partnering, Continual Learning, Flexibility, External Awareness, Technical Competence & Technical Credibility in conjunction with natural resources/conservation professional competencies.

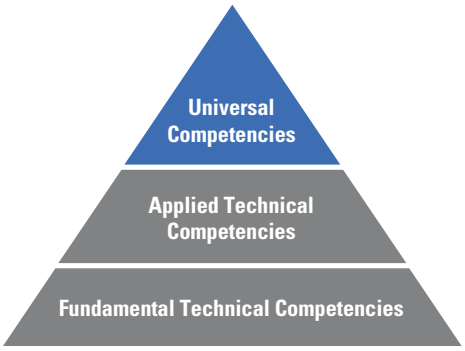
DOI CARP Institutional Approach:
#1 – Use Best Available Science and Traditional Knowledge

APPLY NATURE-BASED SOLUTIONS AND ECOSYSTEM-BASED APPROACHES:

Implements actions that will reduce vulnerability of human and natural systems to climate change and increase ecosystem resilience, sequester greenhouse gasses, and protect ecosystem services.

Related competencies: Technical Competence & Technical Credibility in conjunction with natural resources/ conservation professional competencies,

DOI CARP Institutional Approach:
#9 – Apply Nature-Based Solutions and Ecosystem-Based Approaches



Universal Competencies

DECISION MAKING:

Makes sound, well-informed, and objective decisions; perceives the impact and implications of decisions; commits to action, even in uncertain situations, to accomplish organizational goals; causes change.

Related competencies: Decision Support, Decisiveness, Interpersonal Skills, Planning for Uncertainty

DOI CARP Institutional Approach:
#1 – Use Best-Available Science and Traditional Knowledge and #5 – Maximize Co-Benefits

CLIMATE COMMUNICATION:

Exercises methods of values-based, engaging, and culturally sensitive communication of climate adaptation concepts and needed actions.

Related competencies: Communications & Media, Oral communication, Written communication, External Awareness, Interpersonal Skills, Client Engagement/ Change Management

DOI CARP Institutional Approach:
#2 – Mainstream Adaptation, #3 – Tackle Inequity and Environmental Justice

BUILD STRONG PARTNERSHIPS:

Develops adaptation strategies that are collaborative and coordinated across multiple scales and with diverse partners. Cultivates stakeholder support and buy-in.

Competencies: Partnering, Organizational Awareness, External Awareness, Leveraging Diversity, Strategic Thinking, Influencing/ Negotiating, Vision, Stakeholder Engagement

DOI CARP Institutional Approach:
#4 – Build Strong Partnerships and #5 – Maximize Co-Benefits

MAXIMIZE CO-BENEFITS:

Develops and implements adaptation strategies that will complement other initiatives, e.g., Tribal sovereignty and self-determination, improving disaster preparedness, promoting sustainable resource management, addressing environmental justice, restoring contaminated lands, managing sustainable facilities to reduce energy and water consumption, and reducing greenhouse gas emissions.

Related competencies: Partnering, Organizational Awareness, External Awareness, Leveraging Diversity, Strategic Thinking, Influencing/Negotiating, Vision, Technical Competence & Technical Credibility in conjunction with a variety of professional competencies.

DOI CARP Institutional Approach:
#4 – Build Strong Partnerships and #5 – Maximize Co-Benefits

ENVIRONMENTAL JUSTICE AND EQUITY:

Integrates into decision-making to ensure that adaptation efforts are sustainable and consider impacts for all populations. Considers these impacts while examining the range of relevant and plausible future conditions in the scenario planning process.

Related competencies: External Awareness, Leveraging Diversity, Diversity and Inclusion, Interpersonal Skills, Public Planning

DOI CARP Institutional Approach:
#3 – Tackle Inequity and Environmental Justice

SYSTEMS THINKING:

Understands how a system works holistically and how the individual parts of the system interact. Evaluates multiple perspectives and understand how components contribute to issues and strengths within the system. Adopts a practice of adaptive learning and challenges predisposed ways of seeing and performing a task.

Related competencies: Strategic Thinking, Organizational Awareness

DOI CARP Institutional Approach:
#1 – Use Best-Available Science and Traditional Knowledge, #2 – Mainstream Adaptation, #5 – Maximize Co-Benefits

CHANGE MANAGEMENT:

Understands change management principles, strategies, and techniques required for effectively planning, implementing, and evaluating change in the organization.

Related competencies: Client Engagement/Change Management, Stakeholder Management, Interpersonal Skills, Public Planning

DOI CARP Institutional Approach:
#3 – Tackle Inequity and Environmental Justice

MAINSTREAM ADAPTATION:

Integrates climate change adaptation into policies, planning, practices, and programs. This will ensure that decisions are not solely based on historic conditions but also consider novel future scenarios and future-oriented management.

Competencies: Organizational Awareness, Strategic Thinking

DOI CARP Institutional Approach:
#2 – Mainstream Adaptation

The Developmental Framework

The following is a list of courses and other resources that will provide a training framework for developing proficiency in each competency. Note that the Course Objectives (CO) and Learning Objectives (LO) are taken directly from the agency descriptions of each course. This Framework is very general in nature and will help develop broad climate change expertise. The next step is to develop more refined pathways for specific needs (e.g., application of the Resist-Accept-Direct (RAD) framework), programs (e.g., Joint Administrative Operations) or job series (e.g., biologists, leaders).

Courses Addressing Fundamental Technical Climate Change Competencies

CLIMATE SCIENCE

Source	Name	Pertinent Course Objectives (CO) or Learning Objectives (LO)
NCTC	Climate Fundamentals for USFWS Employees	CO: Provides a foundational level of knowledge about the Earth's climate system, the changes we are currently experiencing in that system … and why these fit into programmatic responsibilities. LO: List one reason climate change is important to you and your job. LO: Distinguish the difference between weather and climate;
NCTC	Climate Academy	LO: Explain the scientific basis of climate change
USFS	Climate Change Science and Modeling	LO: Know the main greenhouse gases contributing to climate change, LO: Know how the greenhouse effect works, LO: Know the flow of carbon through the carbon cycle.
NCTC	Ecological Adaptation Microlearning page	Series of short videos not structured into a course, but an excellent resource for independent viewing

CLIMATE CHANGE IMPACTS

Source	Name	Pertinent Course Objectives (CO) or Learning Objectives (LO)
NCTC	Climate Fundamentals for USFWS Employees	LO: Compare the climate change differences observed globally vs regionally, with refuge examples. LO: List several regional biological changes observed as a result of a changing climate.
NCTC	Climate Academy	LO: Understand biological impacts of climate change.
USFS	Climate Change Science and Modeling	LO: Users should know examples of climate change impacts by region.
USFS	Climate Change Effects on Forests and Grasslands	CO: Brief overview of current and projected climate change effects on water resources, vegetation, wildlife, and disturbances, specifically geared towards forest and grassland ecosystems. LO: Provide examples of beneficial or stressful climate change effects on different ecosystems, LO: Understand variations in observed and projected changes and intensity of changes for regions around the country, LO: Know how changes in precipitation patterns, snow cover, and streamflows have been occurring around the country and are expected to continue changing during this century, LO: Provide examples of phenological changes associated with an increase in growing season length,

CLIMATE CHANGE MITIGATION

Source	Name	Pertinent Course Objectives (CO) or Learning Objectives (LO)
NCTC	Climate Fundamentals for USFWS Employees	LO: Define what mitigation and adaptation are in the climate context
USFS	Responses to Climate Change	LO: Provide mitigation options for land management, LO: Know differences between adaptation, mitigation, and restoration.
ITEP	Climate Change 202: Tribal Hazard Mitigation Planning Cohort	CO: Tribal communities are at the forefront of experiencing extreme weather events and natural hazards. One opportunity to prepare for and mitigate against these hazards is for Tribes to write Tribal Hazard Mitigation Plans (THMPs).

CLIMATE CHANGE VULNERABILITY

Source	Name	Pertinent Course Objectives (CO) or Learning Objectives (LO)
NCTC	Planning for a Changing Climate	CO: Activities will include the development of climate-informed goals and objectives, scenarios to address uncertainty, the evaluation of vulnerability of targets/focal resources in multiple potential futures, and the development/ evaluation of adaptation actions to address identified vulnerabilities. LO: Identify possible adaptation options based on vulnerability information and other management considerations across one or more possible future conditions.
NCTC	Climate Adaptation Workshop	LO: Identify a range of possible adaptation options based on vulnerability information and other management considerations. LO: Evaluate adaptation options from multiple perspectives, including their ability to reduce vulnerability and enhance resilience.

CLIMATE CHANGE RISK

Source	Name	Pertinent Course Objectives (CO) or Learning Objectives (LO)
NCTC	Planning for a Changing Climate	Not specifically spelled out in CO or Los
NCTC	Climate Adaptation Workshop	LO: Identify climate change impacts that pose the greatest challenges and opportunities for meeting current goals and achieving existing actions. LO: Evaluate project conservation goals from a climate change perspective, identify where existing goals may be compromised by projected climate impacts, and explore modifications needed to craft climate-informed goals;
USFS	Climate Change Effects on Forests and Grasslands	LO: Users should know about increased risks associated with disturbances like insects, invasives, and wildfire.
USFS	Responses to Climate Change	LO: Users should know benefits and risks involved with each of the adaptation options
USGS SE CASC	Using climate projections to support USFWS risk assessments	CO: Climate 101, using climate models, risk assessment. Provided to USFWS ARDs, Species Assessment Teams, state wildlife staff.
NOAA Digital Coast	Building Risk Communication Skills	CO: This training provides insights into how and why people respond to risk, and helps participants develop new skills to better connect with a variety of audiences. Understanding and connecting with an audience's diverse values and concerns can lead to a higher level of community engagement and can help motivate action to reduce risk.
National Disaster Preparedness Training Center	Community Resilience	CO: This course demonstrates how to integrate risk and community-based collaborative strategies into plans and programs and introduces tools that help communities assess individual risks and vulnerabilities, as well as strategies, to become more resilient and better prepared for natural disasters.

CLIMATE CHANGE RESILIENCE

Source	Name	Pertinent Course Objectives (CO) or Learning Objectives (LO)
NCTC	Climate Adaptation Workshop	LO: Evaluate adaptation options from multiple perspectives, including their ability to reduce vulnerability and enhance resilience.
USFS	Responses to Climate Change	LO: Know the three adaptation options: resistance, resilience, and transition. LO: Name differences and similarities between resistance, resilience, and transition. LO: Understand the benefits and risks involved with each of the adaptation options.
BOR (MetEd)	Using the Local Climate Analysis Tool (LCAT) for Water Resilience Decisions	CO: The training illustrates how LCAT analyses can be used to inform the steps to climate resilience outlined in the NOAA Climate Resilience Toolkit.
National Disaster Preparedness Training Center	Community Resilience	CO: This course demonstrates how to integrate risk and community-based collaborative strategies into plans and programs and introduces tools that help communities assess individual risks and vulnerabilities, as well as strategies, to become more resilient and better prepared for natural disasters.

CLIMATE CHANGE ADAPTATION

Source	Name	Pertinent Course Objectives (CO) or Learning Objectives (LO) & other notes
NCTC	Planning for a Changing Climate	CO: This course provides participants with the skills and tools needed to demystify climate adaptation for application to on-the ground conservation. LO: Evaluate conservation goals from a climate change perspective, and align adaptation strategies with climate-informed goals. LO: Explain how climate change vulnerability and climate projections inform adaptation actions. LO: Identify possible adaptation options based on vulnerability information and other management considerations across one or more possible future conditions. LO: Integrate climate adaptation into existing planning and decision-making processes.
NCTC	Climate Adaptation Workshop	CO: This course is based on the guide Climate-Smart Conservation: Putting Adaptation Principles into Practice. LO: Evaluate project conservation goals from a climate change perspective, identify where existing goals may be compromised by projected climate impacts, and explore modifications needed to craft climate-informed goals. LO: Identify a range of possible adaptation options based on vulnerability information and other management considerations. LO: Evaluate adaptation options from multiple perspectives, including their ability to reduce vulnerability and enhance resilience. LO: Design an adaptation planning process that aims to address the effects of climate change on a target (focal) species or ecosystem.
USGS SC CASC	Managing for a Changing Climate (YouTube video series)	This course will provide an integrative understanding of the components of the climate system including the range of natural climate variability and external drivers of climate change, in addition to impacts of a changing climate on multiple sectors such as the economy, policy, ecosystems, and indigenous populations.
NCTC	Resist-Accept-Direct (RAD) webinar series and Workshop	Webinar series was delivered on a monthly basis and a workshop was hosted in January 2023. Currently designing courses and additional workshops.

ECOLOGICAL TRANSFORMATION: Specific courses are not listed because this competency will integrate professional expertise with climate-based knowledge attained through other coursework.

Courses Addressing Applied Technical Competencies

CLIMATE CHANGE SCENARIO PLANNING AND PLANNING FOR UNCERTAINTY

Source	Name	Pertinent Course Objectives (CO) or Learning Objectives (LO)
NCTC	Planning for a Changing Climate	CO: Activities will include the development of … scenarios to address uncertainty and the evaluation of vulnerability of targets/focal resources in multiple potential futures. LO: Complete the basic steps of scenario planning to explore uncertainty by constructing situation-appropriate scenarios for future climatic, social, and ecological conditions. LO: Identify possible adaptation options based on vulnerability information and other management considerations across one or more possible future conditions.
NCTC	Climate Adaptation Workshop	CO: This course is based on the guide Climate-Smart Conservation: Putting Adaptation Principles into Practice. LO: Identify a range of possible adaptation options based on vulnerability information and other management considerations. LO: Design an adaptation planning process that aims to address the effects of climate change on a target (focal) species or ecosystem.
NCTC	Introduction to Species Status Assessment	Specific to Endangered Species Act decisions. Includes content on the identification of stressors and relating them to scenario levels. LO: Develop future scenarios using information provided by the SSA analysis.
NPS	Scenario Planning: An Introduction (online learning activity)	CO: The activity presents a series of videos that introduce key concepts of scenario planning in the context of climate change adaptation. LO: Identify at least three benefits of using scenarios to inform planning. LO: Identify how scenarios are applied in climate change adaptation planning. LO: Identify at least two additional resources to support NPS scenario planning.

Note: These courses (and perhaps others) need to be more deeply explored for content that addresses climate/emissions scenarios (IPCC): why and how they were created and how they are needed as basis for how to consider future risk

PUBLIC PLANNING

Source	Name	Notes
NCTC	Foundations in Public Participation	CO: This course will provide participants with the knowledge and confidence needed to plan and execute projects that include public involvement and community engagement. The course is divided into two modules, each focusing on one of the two major phases of public communication and participation: planning and techniques.
NPS	Planning for a Changing Climate in National Parks	CO: Provides an in-depth introduction to the NPS Climate Adaptation Planning Cycle. Through a step-by-step application, participants will become familiar with key terms and concepts related to adaptation, scenario planning, and decision frameworks for managing protected areas amidst an era of continuous change. LO: Gain a general understanding of how climate change affects NPS natural and cultural resources, facilities, and visitors' experience, and how some parks are addressing climate-related challenges through planning. LO: Gain experience implementing the six-step planning process described in Planning for a Changing Climate, how it can be used to incorporate climate considerations in a diversity of NPS planning processes and products, and basic information sources to inform the process.

MONITORING, EVALUATION AND ADAPTIVE MANAGEMENT

Source	Name	Pertinent Course Objectives (CO) or Learning Objectives (LO)
NCTC	Decision Analysis for Climate Change	LO: Compare modes of learning about system change and understand when and how to use different approaches. LO: Structure a climate change adaptation decision using adaptive management.
NCTC	Planning for a Changing Climate	LO: Evaluate conservation goals from a climate change perspective and align adaptation strategies with climate-informed goals. LO: Identify possible adaptation options based on vulnerability information and other management considerations across one or more possible future conditions;
NCTC	Adaptive Management: Structured Decision Making for Recurrent Decisions	LO: Describe the process of using adaptive management for managing natural resources. LO: Articulate the role of predictive models in adaptive management and discern the qualities of a desirable set of alternative models;
NCTC	Design and Analysis of Biological Monitoring	CO: This course emphasizes developing skills in the design of monitoring studies and analysis of species/habitat statuses or trends, as well as identifying factors influencing statuses or trends. A course goal is to build a working knowledge of uncomplicated but useful sampling designs, based on the sampling concepts of what, why, when, where, and how many. Participants will analyze data collected in such a framework for status or trend assessment.
USFS	Adaptation and Planning Practices	CO: An active, hands-on training to help natural resources managers incorporate climate change considerations into their own real-world forest management practices.

DOWNSCALING AND APPLICATION OF CLIMATE MODELS

Source	Name	Pertinent Course Objectives (CO) or Learning Objectives (LO)
NCTC	Conservation Biology and Modeling	LO: Demonstrate proficiency in tools used in conservation biology, including population modeling, population viability analysis, modeling and accounting for genetic deterioration, calculation of effective population size and design and management of protected areas or reserves;
NCTC	Modeling Principles for Natural Resources Management (Beginner Track)	LO: Discover how to use models in planning for ecological and conservation biology decisions with defensible results. LO: Describe the modeling process, terminology, use of deterministic and stochastic models, what to leave out of a model, scale and resolution, age or state structured models, and how to deal with uncertainty in making conservation decisions. LO: Build modeling skills. LO: Use decision trees, approach decision-analysis under uncertainty, and incorporate a pragmatic modeling approach to data collection methods and data analysis. LO: Design management-oriented modeling frameworks, qualitative models, and determine where GIS can be useful.
NCTC	Modeling Principles for Natural Resources Management (Intermediate Track)	LO: Discover how to use models in planning for ecological and conservation biology decisions with defensible results. LO: Describe the modeling process, terminology, use of deterministic and stochastic models, what to leave out of a model, scale and resolution, age or state structured models, and how to deal with uncertainty in making conservation decisions. LO: Build more advanced modeling skills. LO: Use decision trees, approach decision-analysis under uncertainty, and incorporate a pragmatic modeling approach to data collection methods and data analysis. LO: Design management-oriented modeling frameworks, qualitative models, and determine where GIS can be useful.
NCTC	Decision Analysis for Climate Change	LO: Learn how to classify and incorporate different types of uncertainty about system change.
NCTC	Adaptive Management: Structured Decision Making for Recurrent Decisions	LO: Articulate the role of predictive models in adaptive management and discern the qualities of a desirable set of alternative models
USGS SC CASC	Making Sense of Local Climate Projections (in-person workshop)	CO: Practitioners need a comprehensive suite of climate model projections to address multiple sources of uncertainty. This hands-on workshop is aimed at building participants' confidence in working with these climate projections by solving a real-world management problem.
USGS SC CASC	Climate 101 Workshops (online)	CO: Introduction to climate science, how to interpret climate projections, and regional impacts of changing climate.
NOAA/ NWS	Advanced Climate Variability and Change	CO: Provide advanced understanding of climate variability and change, climate modeling and downscaling, as well as impacts, mitigation, and adaptation related to local and global changes.
MetEd UCAR	Introduction to Climate Models	CO: The module discusses how models are built to simulate climate and generate the statistics that describe it, and concludes with a discussion of how models are tuned and tested.
MetEd UCAR	Preparing Hydro-Climate Inputs for Climate Change in Water Resource Planning	CO: This module describes the process of selecting the best available climate projection information and using it to develop "climate-adjusted weather" inputs to be used for modeling climate change impacts. These modeled impacts can be used for planning of future water resources.

Note: These courses (and perhaps others) need to be explored for content that addresses the difference between climate (physics-based) models and statistical models and why it matters.

USE OF TRADITIONAL KNOWLEDGE

(now referred to as Indigenous Knowledges). Note that there is currently no formal training in this area. Listed below are selected valuable resources.

Source	Name	Notes
NCTC	*Using Traditional Ecological Knowledge to Advance Greater Opportunities to Work Effectively with Indigenous Peoples in a Changing Climate*	This was part of the NCTC *Indigenous Connections Broadcast Series*
NPS	*Traditional Ecological Knowledge web page*	This site is a collaborative collection of information that may be useful for anyone interested in working with the earth and its inhabitants. While hosted by the National Park Service, this site is intended to be a service for all those interested in traditional ecological knowledge.
CASCs	*Exploring the Past to Plan for the Future: Integrating Indigenous Knowledge and Paleoperspectives to Inform Climate Change Adaptation*	"By utilizing both Traditional Ecological Knowledge and western science techniques, this project will: 1) show how two different methods of understanding the environment can be utilized in a resource management context to assist with decision making, 2) establish how useful these methods are in tandem, and 3) provide southwest resource managers with better historic and holistic information to use in resource management decision making."
Tribal Climate Adaptation Guidebook	*Traditional Knowledges web page*	Contains a set of guidelines that "…are intended to provide specific measures that federal agencies, researchers, Tribes and TK holders can follow in conceptualizing, developing, and implementing climate change initiatives involving TKs."
White House OSTP & CEQ	*Guidance for Federal Departments and Agencies on Indigenous Knowledge*	Government-wide guidance and an accompanying implementation memorandum for Federal Agencies on recognizing and including Indigenous Knowledge in Federal research, policy, and decision making.
NCTC	Native Relations Workshops	Currently under development for regional deliveries
FWS	*Traditional Ecological Knowledge for Application by Service Scientists*	This comprehensive Fact Sheet developed in 2011 contains an extensive reference and reading list.

USE OF BEST-AVAILABLE SCIENCE & APPLY NATURE-BASED SOLUTIONS AND ECOSYSTEM-BASED APPROACHES:

Specific courses are not listed because these competencies will integrate professional expertise with climate-based knowledge attained through other coursework.

Courses Addressing Universal Competencies

DECISION MAKING

Source	Name	Pertinent Course Objectives (CO) or Learning Objectives (LO)
NCTC	Decision Analysis for Climate Change	CO: Provides a strong foundation in decision making in the context of natural resources management while decreasing climate-related uncertainty. Approaches to critical thinking, logic, reasoning, and structuring decisions are used. LO: Engage with a team on real-life decisions addressing climate impacts.
NCTC	Planning for a Changing Climate	LO: Identify possible adaptation options based on vulnerability information and other management considerations across one or more possible future conditions. LO: Integrate climate adaptation into existing planning and decision-making processes.
NCTC	Open Standards for Conservation	CO: Equip project teams with the skills necessary for effective project cycle management in the conservation sector.
NCTC	Quantitative Decision Analysis Pathway: Introduction to Structured Decision Making, Adaptive Management: Structured Decision Making for Recurrent Decisions, Decision Analysis: Tools, and electives	Pathway Objective: Builds basic skills in decision theory and the use of analytical tools and methods (e.g., facilitation) to support the decision analysis process.
NCTC	Introduction to Polarity Thinking for Adaptive Leadership	Addresses the concept of polarities, defined as interdependent pairs that need each other over time to achieve a greater purpose shared by both. These pairs could also be called paradoxes, dilemmas, tensions, or adaptive challenges and are unavoidable and inherently unsolvable in that you cannot chose one "solution" to the neglect of the other and be successful over time. We must acknowledge and leverage the natural tension that exists within the polarity with a different approach in order to make sustainable progress on our most complex challenges.

CLIMATE COMMUNICATION

Source	Name	Notes
NCTC	Planning for a Changing Climate	LO: Tell a clear and compelling story of how a conservation project is designed, or can be modified, to increase the potential for climate adaptation.
NCTC	Climate Academy	LO: Effectively communicate climate change impacts to coworkers, stakeholders, and management
NCTC	Communicating Science – Distilling Your Message	Contract course (through the Alda Institute), perhaps best served with climate change fact sheets, job aids or other resources.
NCTC	Science Communication: Crafting Your Message	Contract course (through Compass) LO: Clearly communicate about uncertainty instead of shying away from it.

NCTC	Strategic Communication for Outreach: Overview and Planning	Archived
NCTC	Foundations of Interpretation	
NCTC	Introduction to Visitor Services	Consider integration of climate change content or couple with fact sheets, job aids and other resources.
NCTC	Interpretive Media	Couple with fact sheets, job aids and other resources.
NCTC	National FWS Communications, Outreach and Visitor Services Training Workshop	Agenda varies for each delivery. A specialized plenary session on climate change is worth considering.
NPS	Interpreting Climate Change Self-study Modules	NPS-focused
NOAA Digital Coast	*Building Risk Communication Skills*	CO: This training provides insights into how and why people respond to risk, and helps participants develop new skills to better connect with a variety of audiences.
AAAS	Engaging Communities in Climate Conversations Workshop (no longer offered?)	LO: Consider the American public's attitudes and concerns about climate change and response options. LO: Develop actionable goals for engaging around these topics. LO: Think carefully about their target audience. LO: Craft science and solution-minded messages that will resonate with that audience.
edX.org	Climate Change Communication	CO: This online course will provide educators and volunteers with information about the drivers, impacts, and solutions of climate change, as well as strategies for talking about climate change in an informal education environment.

BUILD STRONG PARTNERSHIPS

Source	Name	Notes
NCTC	Partnership and Community Collaboration: Managing by Network	CO: Centers on the 22 partnership and community collaboration competencies defined by the Office of Personnel Management. Participants will learn how to strengthen formal and informal partnerships, foster community stakeholder engagement, and explore practices and build skills with their interagency peers. Climate Change content is not included, but we should consider augmentation with fact sheets, job aids or other resources.
NCTC	Collaborative Conservation: Partnerships in Practice (Online)	CO: Practical application of skills learned in above course. Worthy of consideration for addition of specific climate change content. May also employ climate change fact sheets, job aids or other resources.
NPS	The National Park Service Partnership and Collaboration Essentials	Online self-paced. In DOI Talent.

ENVIRONMENTAL JUSTICE AND EQUITY

Source	Name	Notes
NCTC	Diversity and Inclusion Competency Learning Series	CO: This series teaches participants to appreciate all types of people and how one's historical culture shapes current attitudes towards individuals from other cultures. You will explore diversity and differing perspectives and create a workplace that is accepting and appreciative of all types of employees.
NCTC	Diversity, Inclusion and Social Awareness	CO: Explore diversity and inclusion in the workplace on many levels: How we define diversity and inclusion; the benefits and power of inclusivity; how we can take a holistic approach to diversity in our organizations; and how to relate and communicate better with everyone you interact with.
NPS	Introduction to Equity in Community Building (Virtual)	CO: Introduce participants to equity, culturally competent approaches, and how to think collaboratively about ways to effectively engage diverse populations/communities in their efforts.
BLM	Diversity and Inclusion Change Agent Training	CO: Understand diversity and inclusion, then actively seek out and leverage differences in order to achieve better, sustained results.
DOI/OEPC	*Environmental Justice Training Resources page*	A list of online resources designed to build the capacity in communities to advance environmental justice (EJ).
EPA	*Environmental Justice Learning Center*	A one-stop training portal of online resources to build the capacity of EPA's partners to advance environmental justice.

SYSTEMS THINKING

Source	Name	Notes
LinkedIn Learning*	Systems Thinking	
NCTC	Introduction to Systems Thinking	Last offered in 2016, currently inactive.
Other		There's an abundance of university-based courses.

*Formerly Lynda.com

CHANGE MANAGEMENT

Source	Name	Notes
NCTC	Leading Change	CO: This course is designed to provide managers and leaders the skills necessary to manage workgroups successfully through change initiatives.
OPM	*Workforce Reshaping web page*	An overview designed to assist workforce reshaping efforts by providing available options and considerations.

MAINSTREAM ADAPTATION

Source	Name	Notes
NCTC	Decision Analysis for Climate Change	LO: Understand how to frame choices to effectively integrate climate change concerns. LO: Compare modes of learning about system change and understand when and how to use different approaches.
NCTC	Planning for a Changing Climate	LO: Evaluate conservation goals from a climate change perspective, and align adaptation strategies with climate-informed goals. LO: Explain how climate change vulnerability and climate projections inform adaptation actions. LO: Identify possible adaptation options based on vulnerability information and other management considerations across one or more possible future conditions. LO: Integrate climate adaptation into existing planning and decision-making processes. LO: Tell a clear and compelling story of how a conservation project is designed, or can be modified, to increase the potential for climate adaptation.
EPA	Climate Change Adaptation Resource Center (ARC-X) – *Local Government Climate Adaptation Training*	The training illustrates how a changing climate may affect a variety of environmental and public health services.
NOAA Digital Coast	Adaptation Planning for Coastal Communities	CO: To gain a thorough grounding and practical skills for incorporating adaptation strategies into planning processes.
OECD *	Integrating Climate Change Adaptation into Development Planning (Training manual)	* Organization for Economic Co-operation and Development

MAXIMIZE CO-BENEFITS: Specific courses are not listed because this competency will integrate professional expertise with climate-based knowledge attained through other coursework.

Staying Current

The field of climate change is constantly evolving. The following webinar series, communities of practice, podcasts and other resources will help you stay current.

The Resist-Accept-Direct (RAD) Webinar Series.
The Resist-Accept-Direct (RAD) Framework is a tool to address ecological transformation. This series of webinars serves to inform members of the US Fish and Wildlife Service about its utility and use, and will culminate in a workshop in December, 2022.

Status of Tribes and Climate Change (STACC) Webinar.
The Status of Tribes and Climate Change (STACC) Report seeks to uplift and honor the voices of Indigenous peoples across the U.S. to increase understanding of Tribal lifeways, cultures, and worldviews, the climate change impacts Tribes are experiencing, the solutions they are implementing, and ways that all of us can support Tribes in adapting to our changing world.

Institute for Tribal Environmental Professionals (ITEP) webinars.
Webinar schedule.

USFWS Climate Change Community of Practice.
Meets the first Thursday of every month with presentations on current topics. Subscribe by contacting *Jason Goldberg* from USFWS Science Applications.

Climate Adaptation for Forest-Dependent Wildlife webinar series.
Developed in partnership with the U.S. Forest Service Northern Institute of Applied Climate Science (NIACS).

Indigenous Connections Broadcast Series.
While these webinars cover a broad range of topics related to Indigenous Knowledge, several of which are specific to climate change.

Safeguarding Wildlife from Climate Change webinar series
(currently inactive and being considered for revival).

Acronyms

AAAS	American Association for the Advancement of Science
BLM	Bureau of Land Management
BOR	Bureau of Reclamation
CARP	DOI Climate Adaptation and Resilience Plan
CEQ	The White House Council on Environmental Quality
DOI/OEPC	U. S. Department of the Interior Office of Environmental Policy and Compliance
EPA	U.S. Environmental Protection Agency
IPCC	Intergovernmental Panel on Climate Change
ITEP	Institute for Tribal Environmental Professionals
MetEd UCAR	Training Resources for the Geoscience Community by the University Corporation for Atmospheric Research
NCTC	National Conservation Training Center (U.S. Fish and Wildlife Service)
NOAA	National Oceanic and Atmospheric Administration
NOAA/NWS	National Oceanic and Atmospheric Administration/National Weather Service
NPS	National Park Service
OPM	U.S. Office of Personnel Management
OSTP	The White House Office of Science and Technology Policy
SC CASC	South Central Climate Adaptation Science Center
SE CASC	Southeastern Climate Adaptation Science Center
USFS	United States Forest Service
USFWS	U.S. Fish and Wildlife Service
USGS	U. S. Geological Survey