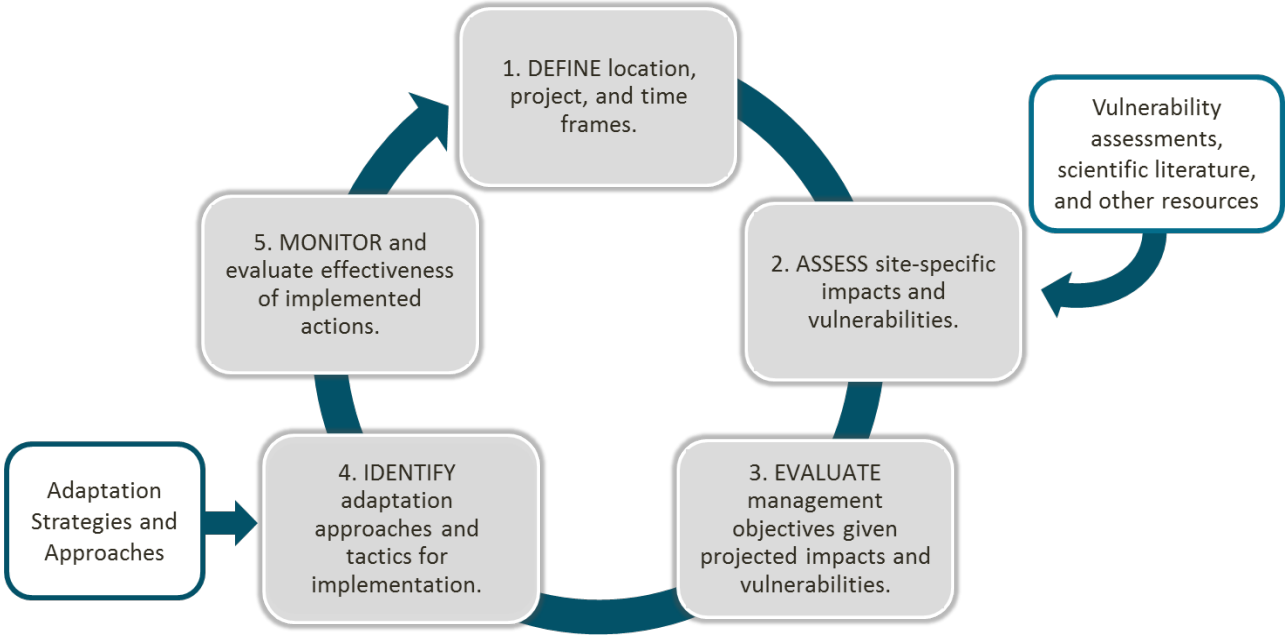
Role-Playing Activity: Planning for the Future

Group Activity: Your group represents the management team in the Snake River Plain. You are highly concerned about the future of the sagebrush ecosystem with climate change. Your job is to work through the first four adaptation planning steps for your Refuge.

Background information for your Refuge: Your Refuge spans over 300,000 acres and is home to a diverse set of species, including the pronghorn, greater sage grouse, and big sagebrush. In the last several years, your Refuge has experienced an increase in wildfire conditions and nonnative species, such as cheatgrass. Your objective is to maintain ecological function, but your team has been struggling to find successful post-fire management strategies as the climate changes across the region. As part of this activity, you need to identify your current management objectives/strategies, assess current and future climate impacts, consider the RAD transformation planning framework, evaluate current objectives/strategies in light of future climate change and the RAD framework, and identify how you would change your management actions if needed.



Initial Tasks: Before you start the activity, identify who within your group will serve in the following roles:

- Team Lead
- Timekeeper
- Notetaker(s)
- Group Spokesperson

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Part 1 (15 min) – Current Management Objectives

- **Identify at least 2-3 current management objectives and strategies for your sagebrush habitat.**
  - For each objective, brainstorm a strategy/treatment that would help you reach that objective.
  - Remember, your Refuge is facing increasing wildfire conditions and an expansion of non-native grasses, so think about your objectives in light of this information.

TABLE 1

Management Objectives	Management Strategy
EXAMPLE: Reduce the extent of cheatgrass	*EXAMPLE: Use herbicides to control the extent of cheatgrass*

Part 2 (20 min) – Assessing Current Climate Impacts

- **Based on what you know about sagebrush sensitivity to climate change, select the impacts you see currently affecting the sagebrush habitat in your own area of management**.
    - Select the top 3 climate change impacts you believe are the greatest risk for the sagebrush habitat today and fill out **Table 2.**

TABLE 2

Which of these regional climate change impacts affects the <u>sagebrush habitat today</u>? Select your top 3 concerns.	**How are these regional climate change impacts affecting your sagebrush habitat?**
☐ Warmer temperatures (annual and seasonal) ☐ More days with extreme heat ☐ Fewer days with extreme cold ☐ Uncertain annual precipitation ☐ Altered seasonal changes in precipitation ☐ More frequent heavy precipitation events ☐ Less snow/shorter winter season ☐ Altered stream flows ☐ Reduced soil moisture in summer ☐ Longer growing season ☐ Potential for early spring thaws/late frosts ☐ Declines in streams, riparian areas, and wetland ecosystems ☐ Lack of regeneration post-disturbance ☐ More frequent and intense storms ☐ Potential changes in wildfire frequency and severity ☐ Increases in insect pests and pathogens ☐ Increases in nonnative plant species ☐ Changes in patterns of herbivory ☐ Other:	

Part 2 cont.

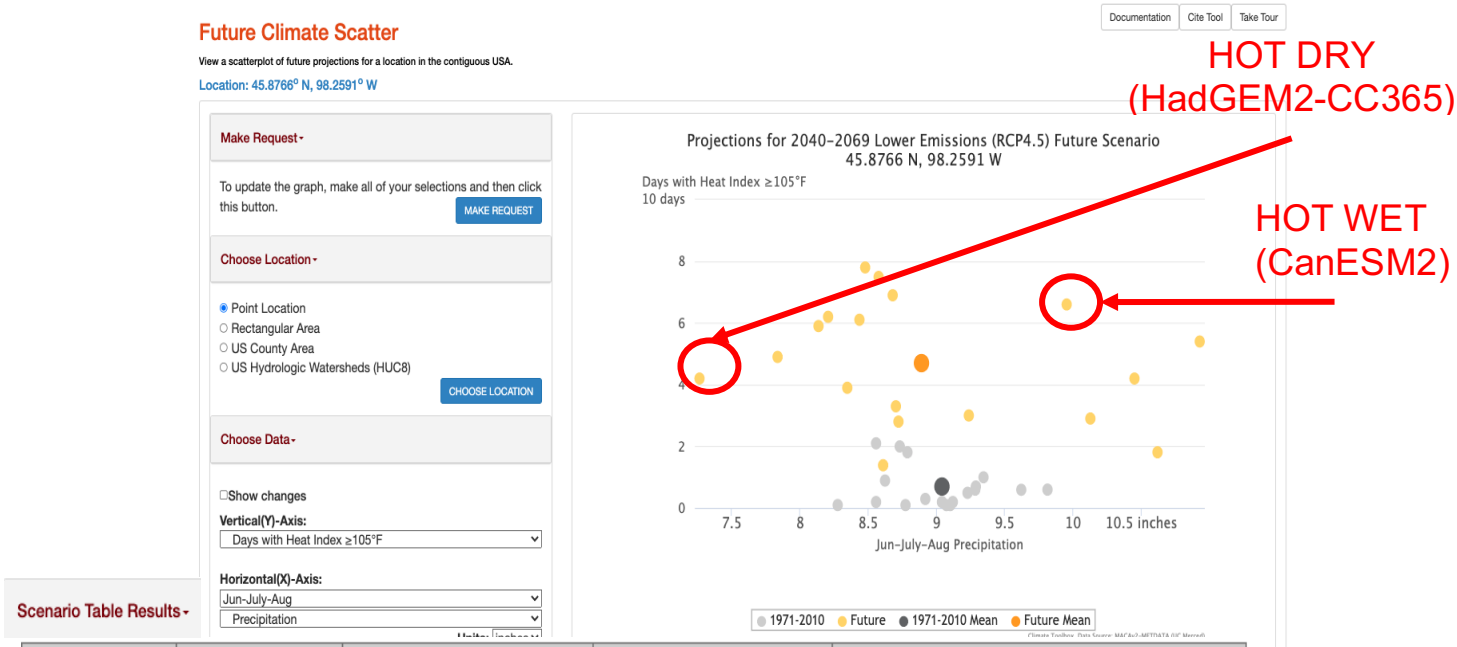
- **Reflect on how climate change impacts that you see today are affecting different species within the sagebrush habitat (e.g., pronghorn, greater sage-grouse, bighorn sheep, bluebunch wheatgrass, etc.)**.

TABLE 3

Species of Interest (plant or animal)	How could these regional climate change impacts also affect your species of interest?
EXAMPLE: Greater sage-grouse	*EXAMPLE: With warmer and drier conditions, sagebrush habitat is more vulnerable to fire and cheatgrass expansion. With less viable habitat, we have started seeing a decline in our greater sage-grouse population.*

Part 3 (30 min) – Assessing the Future Climate Conditions

- **Assess your Refuge's future climate for the mid-Century (2040-2069) using the Climate Data Portal – Future Climate Scatter Tool** (https://climatetoolbox.org/tool/future-climate-scatter).
    - Select your location using the lat/lon provided and pick out your variables of interest.
        - If you are unsure of what to select for the variables, you can use annual (Jan-Dec) precipitation (y-axis) and maximum temperature (x-axis).
    - Choose RCP 4.5 as the emissions scenario and mid 21st Century.
    - Click on the Make Request button at the top.
    - After the map updates, look at the spread of the model results.
        - Choose 2 divergent models in the scatter of results and record the model name and data in the Scenario Table by clicking on the dots.
        - Save the Scenario Table.



SCENARIO	TIME PERIOD	MODEL	X-VALUE	Y-VALUE
Scenario	Time Period	Model	Jun-July-Aug Precipitation(inches)	Dec-Jan-Feb Days with Heat Index ≥105°F(days)
RCP 4.5	2040-2069	CanESM2	10	6.6
RCP 4.5	2040-2069	HadGEM2-CC365	7.3	4.2
HISTORICAL	1971-2010	20CMIP5ModelMean	9	0.7

Part 3 cont.

- **After you have selected your two models, you will download your climate scenarios using the Climate Data Portal – Future Climate Scenarios Tool for your location** (https://climate.northwestknowledge.net/NWTOOLBOX/climateScenarios.php).
    - Under the scenarios section of the tool, put in the model information from the previous step for Scenarios 1 and 2, choose RCP 4.5 for both, and make sure you are looking at the Mid-Century data. You can name them Scenario 1 and Scenario 2 for now.
    - On the next step, select metrics that are most important to your sagebrush habitat.
        - Select at least 3 metrics for your data.
    - Click on **View Report** to see the data for your location.
        - Download the data as either a CSV or PNG file (should look something like the figure shown).

Climate Scenarios

The summary table below describes changes in the future climate by 2050 (2040-2069) relative to the 1971-2000 period under climate scenarios: **Scenario 1** (20CMIP5ModelMean.rcp85), **Scenario 2** (20CMIP5ModelMean.rcp45)

Climate Metric	Scenario 1	Scenario 2	Historical Value
Winter Mean Temperature(°F) (change relative to historical by °F)	**38.76 (5.47)**	**37.37 (4.08)**	**33.29**
Winter Precipitation (% change relative to historical)	**1.80 (17.65)**	**1.73 (13.07)**	**1.53**
Winter Potential Evapotranspiration (% change relative to historical)	**4.43 (38.87)**	**4.11 (28.84)**	**3.19**
Winter Maximum Temperature(°F) (change relative to historical by °F)	**51.48 (5.01)**	**50.17 (3.70)**	**46.47**
Coldest Winter Day (relative to historical by °F)	**1.49** (7.54)	**0.96** (5.09)	**6.05**
Hottest Summer Day (relative to historical by °F)	**104.39** (6.70)	**102.64** (4.95)	**97.69**
Day of First Fall Freeze (relative to historical by days)	**Oct. 17** (12.80)	**Oct. 13** (8.70)	**Oct. 4**
Day of Last Spring Freeze (relative to historical by days)	**Apr. 13** (-15.00)	**Apr. 19** (-9.80)	**Apr. 28**

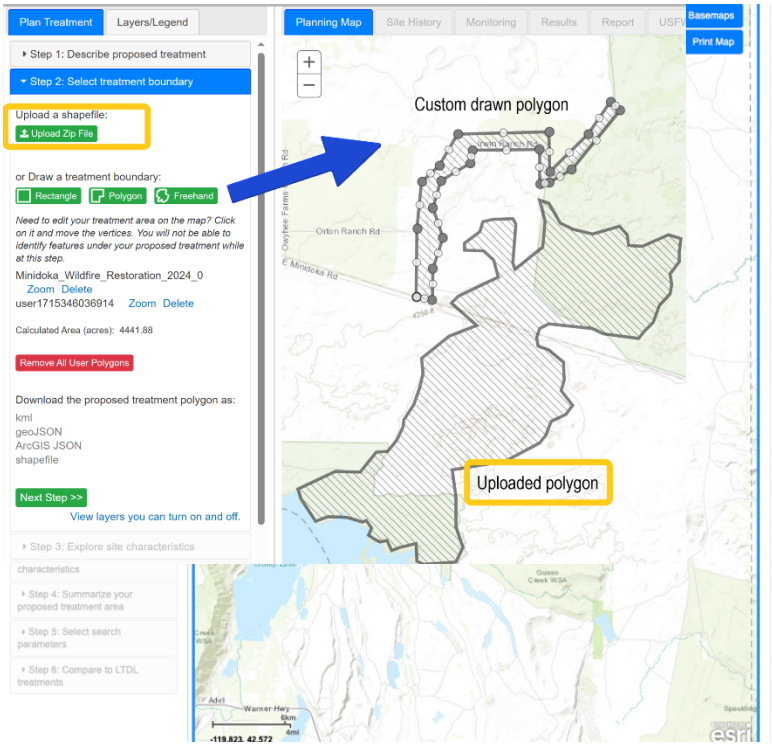
Quantities and projected changes described above are for the location at 39.7392°N; 104.9903°W and a mean elevation of ?? ft.. Winter is Dec, Jan, Feb; Spring is Mar, Apr, May; Summer is Jun, Jul, Aug and Fall is Sep, Oct, Nov.

Dataset: MACA-METDATA v2 (4-km downscaled climate projections), VIC (v4.1.2) forced by MACAv2-LIVNEH (6-km hydrology projections) and gridMET (4-km historical).

- **We have only explored two of the tools in this toolbox, but there are several more! If you have some time, feel free to explore more of the tools that you think might be helpful as you think about management strategies for this situation.**

Part 4 (45 min) – Explore Potential Treatments

- **Explore site conditions and treatment options from your management/strategies listed in Part 1 using the Land Treatment Exploration Tool** (https://www.usgs.gov/apps/land-treatment-exploration-tool/map#)
    - Select your treatment option(s) from the dropdown menu in Step 1 and name your project
    - In Step 2, either upload the provided boundary or digitize a custom area with the drawing options (see example to the right).
    - In Step 3, you can explore information about the site's characteristics, including past treatments, wildfire occurrences, vegetation type, historical climate, recent drought history, and projected short-term drought conditions by clicking on the Site History tab at the top.
        - Take some time and explore what you see for your area.
        - What are some things that stick out to you that might affect your management efforts?
        - Take note of what comes to mind below:



    - Look at the Drought Forecast tab to explore how your conditions might change in the next 12 months. How does this short-term forecast compare with the long-term trends you saw?

    - In Steps 4-6, you can select additional data for your treatment report and define search parameters to explore similar and other treatments that occurred nearby. If you have time, feel free to explore these steps, but don't worry if you run out of time.

Note: This tool is helpful for looking at what has worked or not worked in the past (learn more about the tool for management planning). However, it does not yet include long-term future climate information.

Part 4 cont.

- **Build out the ecological implications in a narrative for your contrasting, yet plausible, climate futures you explored in Part 3.**
    - Your climate futures should characterize different ends of the climate spectrum.
    - Develop names for your different futures (e.g., Hot & Humid, Desert Heat, etc.) and write up descriptions in **Table 4**.
        - Using the information from the Climate Toolbox, Land Treatment Exploration Tool, and your knowledge of the habitat, write out what these conditions mean for sagebrush and the associated species and biophysical conditions.

TABLE 4

Title of Climate Future 1	**Title of Climate Future 2**
Description of the ecological implications under Climate Future 1	*Description of the ecological implications under Climate Future 2*

Note: There are other approaches to selecting climate projections and it is dependent on the type of decision you are needing to make. If you are unsure of what to do, feel free to reach out to your regional Climate Adaptation Science Center team to learn more about what approach is best for your situation.

Part 5 (30 min) – Revisiting Management Objectives

- **Evaluate your current management objectives in light of climate change, scenario planning, site characteristics, and the RAD framework.**
    - Are they still valid in a changing climate? Consider actions that may be available to counter, alleviate, or avoid the worst effects of future climate change.
    - Are there new objectives you want to include?
    - Are you mainly focused on resisting, accepting, or directing change?
        - Classify your management objectives as Resist, Accept, or Direct actions.

Definitions from FWS:

- **Resist** represents traditional wildlife management. Actions are taken to counteract changes and restore habitats and populations to baseline conditions.
- **Accept** is a conscious decision to take a hands-off approach to the transformation, allowing habitats to transition without intervention. This method accepts the loss of some species and habitats and the establishment of others.
- **Direct** allows managers to incorporate future projections of the land [and climate] and take actions that work alongside occurring transformations. The goal is to steer change in ways that continue to support biodiversity and provide ecosystem services.

TABLE 5

Management Objectives	Management Strategies	Keep, revise, or remove?	If revise, how so?	RAD Classification
EXAMPLE: Reduce the extent of cheatgrass	*EXAMPLE: Use herbicides to control the extent of cheatgrass*			

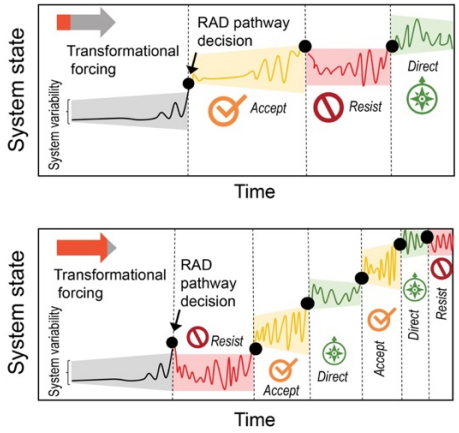
STEP 6 (30 min) – Reflection Activity

What are the major climate concerns for your sagebrush habitat?

What are the management objectives/strategies/treatments you propose moving forward?

Do you see a trend towards accepting, directing, or resisting change? Is there a strategic reason for your selected tactics? How might these change over time and shift between accepting, directing, or resisting change (see image below)?

b) Resist–Accept–Direct framework



How might you incorporate this type of information into a planning effort like a comprehensive conservation plan, habitat conservation plan, species status assessment, etc.?

Do you think a longer-range plan (e.g., end-of-century) would be helpful?

What might be the implications of your near-term actions on longer-range planning? Are they helpful or hurtful for future adaptive pathways?