



**Date:** June 26, 2023  
**To:** Devin Middlebrook, Tahoe Regional Planning Agency (TRPA)  
**From:** Aleka Seville, Collective Strategies Consulting  
**Project:** Tahoe Climate Resilience Dashboard  
**Task:** Task 2.3 Scan of Best Practices – Best Practices Summary

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## Project Background

The Tahoe Regional Planning Agency (TRPA) is designing a new Climate Resilience<sup>1</sup> Dashboard (Dashboard) to **provide a broad understanding of climate action in Tahoe for decision makers and public stakeholders**. The existing TRPA Sustainability Dashboard needs to be revised to better reflect how climate change is impacting the region and what TRPA and other local agencies are doing to reduce greenhouse gas emissions and to build a more resilient region. According to TRPA's recent Climate Resilience Dashboard White Paper:

“The current dashboard tracks 31 sustainability metrics across the triple bottom line of environment, community, and economy. The metrics are organized by 11 sub-categories. These metrics are updated on an annual basis as data is available. Since development of the sustainability dashboard, data for some of the metrics has become impossible or highly difficult to collect. The overall dashboard also needs to be refreshed to better reflect current science and action toward climate resilience.”

The new Dashboard should tell the story of climate action in the Tahoe Basin. This narrative will focus on helping users understand the following:

- **Which** metrics are important to measure and **why**.
- **What** the region/TRPA is doing to address that metric and how much progress (**where**) the region has made towards specific goals tied to these metrics.

TRPA met with key stakeholders at an in-person workshop in June 2023 to gather input on this approach, discuss specific indicators and performance metrics to include in the new Dashboard and to better understand key audiences for the Dashboard. Workshop participants identified local and state agency staff working to advance climate action as the key audience for the dashboard. This effort should support staff that design and implement climate programs and policy and are tasked with communicating progress to their Board's and Council's as well as to the public. Specifically, stakeholders at the in-person workshop outlined the following goals for the new Dashboard:

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<sup>1</sup> TRPA uses the term “climate resilience” to encompass all climate action efforts, including both greenhouse gas (GHG) mitigation and efforts to adapt and build resilience to climate change impacts. The state of California uses the term “climate resilience” when referring specifically to efforts to adapt and build resilience to climate change impacts, which may or may not also reduce GHG emissions.

- Dashboard should be built for use by local and state agency staff to support them in:
  - Telling the story of climate action in the Tahoe Basin to local elected officials and other decision makers to build support for ongoing action.
  - Coordinating climate action efforts at the regional level across agencies and jurisdictions.
  - Positioning the region for new funding opportunities by highlighting areas where additional funding is needed to reach climate goals.

These stakeholders also noted that the general public (e.g., Tahoe residents, local business owners, visitors) should be kept in mind as a secondary audience for the Dashboard but acknowledged that very few members of the general public would likely use the Dashboard. Instead, the primary Dashboard audience, local and state agency staff, should be able to use the Dashboard as a tool to help them communicate with both decision makers and, when relevant, the public. The Dashboard may include “calls to action” to help local and state agency staff provide the public with specific ways to take individual climate action to advance regional climate goals. This information would be provided largely through partnering with local and state agencies to link the Dashboard to relevant publicly available programs and resources that provide opportunities to take individual action to mitigate greenhouse gases and/or improve community resilience.

With these goals and audiences in mind, the following summary provides an overview of best practices in climate resilience indicator and performance metric development. Collective Strategies also reviewed existing climate dashboards identify key dashboard design features relevant for TRPA’s project goals and primary dashboard audiences. These example dashboards were chosen to provide examples of climate dashboards created by national, regional, and local agencies with goals and audiences like those of TRPA.

## Key Takeaways and Recommendations

### Indicator and Performance Metric Development

- Agencies at the national, state, and local level struggle to identify and communicate relevant indicators and performance metrics that provide a comprehensive understanding of climate change impacts in specific geographies and regions. These efforts are ongoing and will continue to evolve along with climate action goals.
  - **We recommend that TRPA continue to track best practices at the state and national level and to integrate new resources and data as relevant to ensure that the Dashboard is aligned with and can benefit from these efforts.**
- Agencies tend to use the term “metric” and “indicator” interchangeably or to use just one or the other. For example, the US EPA uses the term “climate change indicator” and does not refer to these data as “metrics.” The state of California, in contrast, uses these terms somewhat interchangeably. California created a Resilience “Metrics” Working Group (RMWG) which then developed a list of resilience “indicators” to help track progress and guide decision making

across the state. The indicators developed by California's RMWG are high level and require the tracking of multiple specific performance metrics to gauge progress towards climate goals.

- **We recommend that TRPA revise their Dashboard to include “indicators” that refer to a trend that provides valuable information on climate action progress that are measured and tracked using specific “performance metrics.”**
- Understanding the intended audience for the new Dashboard and how they will engage with the data is key to developing indicators and performance metrics that are meaningful and useful.
  - **We recommend that TRPA develop the new Dashboard for use by local and state agency staff to use as a tool to support communication with local Council's and Board's (e.g., decision makers) as well as potential funders.**
- Defining clear, measurable long-term outcomes is critical for tracking progress in building resilience beyond reducing GHG emissions - indicators should be aligned with and relevant to these outcomes.
  - **We recommend that TRPA reorganize the Dashboard based on specific long-term outcomes aligned with the State of California's Adaptation Strategy: Resilient Social Systems, Resilient Natural Systems and Resilient Built Systems. TRPA should integrate regional GHG mitigation goals into these three outcome categories.**
- Indicators should be clear and relevant to the intended audience but tied to specific performance measures that directly inform policy and implementation. For example, an indicator of a Resilient Built System could be reduced (or low) physical exposure to climate risks and hazards in residential buildings and the performance metric that help track progress could be percent of residential buildings retrofitted to withstand a 5-year storm with no damage and percent of residential buildings with air conditioning.
  - **We recommend that TRPA start to identify indicators by organizing existing regional climate goals under the long-term outcomes identified above and then identifying specific indicators and performance metrics to track progress towards those goals. Once existing goals are integrated, TRPA can identify additional indicators and performance metrics that will provide local and state agency staff with relevant data to communicate progress towards these long-term outcomes and goals.**
- Prioritizing specific indicators to track progress against will inevitably involve trade-offs. State agencies in California are working to align the goals, targets, and indicators in various climate related plans such as the state's Adaptation Strategy and the state's Natural and Working Lands Climate Smart Strategy.
  - **We recommend that TRPA work with other regional agencies to ensure that any indicators and performance metrics used in the new Dashboard reflect local climate action goals and plans and that potential trade-offs are considered (e.g. prioritizing conservation in a specific area may impede efforts to reduce vehicle miles traveled (VMT) at a regional level).**

## Dashboard Design and Maintenance

- Many of the dashboards we reviewed were outdated, included broken links and/or disclaimers about data not being updated frequently or just not available.
  - **TRPA should consider setting clear expectations for users about how often the performance metrics will be updated and provide explanations if some metrics will be updated more frequently than others.**
- The US EPA has developed a list of over 50 climate change indicators that provide valuable information on climate change impacts and trends across the US. They have also established a set of 10 criteria to evaluate potential indicators and key considerations to guide any updates to the indicator list.
  - **We recommend TRPA consider developing a similar set of criteria and considerations to help guide the development of a revised set of indicators and performance metrics for the new Dashboard development as well as future updates and revisions.**
- Many climate dashboards are created to communicate progress on a specific plan which helps to organize the dashboard by priorities or goals and illustrate progress in that specific area.
  - **TRPA should consider what programs, goals, plans and actions the agency is already committed to reporting on and consider how to integrate this reporting into regular dashboard updates.**
- Some dashboards include explanations about challenges and barriers like lack of funding, lack of staffing or lack of information that impede progress in certain areas.
  - **TRPA should consider how the new Dashboard can help increase transparency around specific challenges and barriers that limit local and state agency staff member's ability to make progress on specific climate goals.**
- There are key features associated with dashboards that are built for local and state agency staff to support their work to both track and communicate progress towards specific climate goals. These include (but are not limited to) clear explanations of who the dashboard is for, sitemaps and search functions to help the user find the specific information they are looking for and narrative and graphic status updates tied to specific goals and targets.
  - **We recommend that TRPA identify specific key features for the new Dashboard that align with their goals for the project. The example dashboards below provide a starting point to understand which features would be most helpful for local and state agency staff and we recommend TRPA solicit specific input from local and state agency staff on desired dashboard features to ensure that the new Dashboard is useful for this audience.**

## Overview of State Actions and Best Practices in Indicator Development

The US EPA maintains and updates a website that outlines over 50 key climate change indicators for the US. EPA provides narratives that explain why each indicator is important to track to understand how

climate change is impacting various regions. According to the US Environmental Protection Agency<sup>2</sup> (EPA) an indicator “represents the state or trend of certain environmental or societal conditions over a given area and a specified period of time.” The EPA has chosen to compile and publish climate change indicators that provide evidence of “what climate change looks like” to inform scientists, analysts, decision makers, educators, and the public’s understanding of these trends. The EPA has developed 10 criteria that are used to evaluate potential indicators:

1. **Trends over time:** Data are available to show trends over time. Ideally, these data will be long-term, covering enough years to support climatically relevant conclusions. Data collection must be comparable across time and space. Indicator trends have appropriate resolution for the data type.
2. **Actual observations:** The data consist of actual measurements (observations) or derivations thereof. These measurements are representative of the target population.
3. **Broad geographic coverage:** Indicator data are national in scale or have national significance. The spatial scale is adequately supported with data that are representative of the region/area.
4. **Peer-reviewed data** (peer-review status of indicator and quality of underlying source data): Indicator and underlying data are sound. The data are credible, reliable, and have been peer-reviewed and published.
5. **Uncertainty:** Information on sources of uncertainty is available. Variability and limitations of the indicator are understood and have been evaluated.
6. **Usefulness:** The indicator informs issues of national importance and addresses issues important to human or natural systems. It complements existing indicators.
7. **Connection to climate change:** The relationship between the indicator and climate change is supported by published, peer-reviewed science and data. A climate signal is evident among stressors, even if the indicator itself does not yet show a climate signal. The relationship to climate change is easily explained.
8. **Transparent, reproducible, and objective:** The data and analysis are scientifically objective, and methods are transparent. Biases, if known, are documented, minimal, or judged to be reasonable.
9. **Understandable to the public:** The data provide a straightforward depiction of observations and are understandable to the average reader.
10. **Feasible to construct:** The indicator can be constructed or reproduced within a reasonable timeframe. Data sources allow routine updates of the indicator.

EPA uses the following considerations and goals when deciding whether to update or revise these indicators:

- Filling gaps in the existing indicator set to be more comprehensive.
- Newly available, or in some cases improved, data sources that have been peer-reviewed and are publicly available from government agencies, academic institutions, and other organizations.
- Analytical development of indicators resulting from existing partnerships and collaborative efforts within and external to EPA (e.g., development of streamflow metrics in partnership with

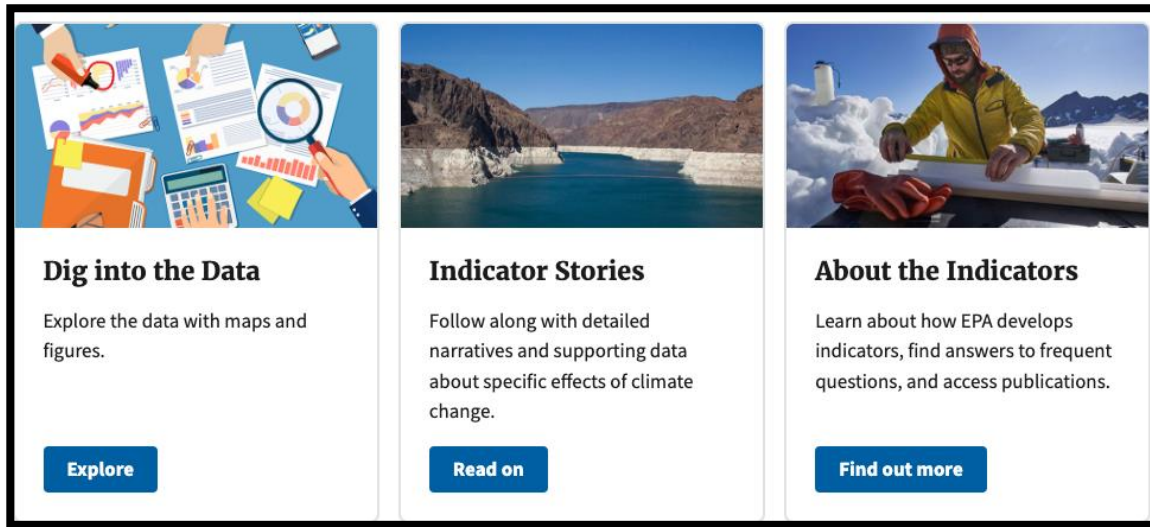
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<sup>2</sup> U.S. Environmental Protection Agency. Climate Change Indicators in the United States. Accessed May, 2023. [www.epa.gov/climate-indicators](http://www.epa.gov/climate-indicators).

the U.S. Geological Survey for the benefit of the partner agencies as well as key programs within EPA’s Office of Water).

- Indicators that communicate key aspects of climate change and that are understandable to various audiences, including the general public.

Figure 1: EPA Climate Change Indicators Homepage Navigation.



These criteria and considerations developed by the EPA could be helpful for TRPA to consider and adapt to guide the current revisions and subsequent updates of the new Dashboard.

### Climate Resilience Indicator Development in California

The State of California has ambitious goals to reduce GHG emissions statewide to 40 percent below 1990 levels by 2030<sup>3</sup> and to achieve statewide carbon neutrality by 2045.<sup>4</sup> The state created the Integrated Climate Adaptation and Resiliency Program<sup>5</sup> (ICARP) to guide the state’s response to climate change impacts. ICARP offers programs and services and conducts research to support state and local agency staff in adaptation and resilience planning and implementation. In 2017, the state of California’s Integrated Climate Adaptation and Resiliency Program (ICARP) developed a vision, a set of seven principles and three long-term outcomes that define the characteristics of a resilient California. The long-term outcomes<sup>6</sup> are especially relevant for the Tahoe Basin:

<sup>3</sup> S.B. 32 - California Global Warming Solutions Act of 2016: emissions limit, [https://leginfo.ca.gov/faces/billTextClient.xhtml?bill\\_id=201520160SB32](https://leginfo.ca.gov/faces/billTextClient.xhtml?bill_id=201520160SB32)

<sup>4</sup> Executive Order B-55-18 (2018) <https://www.ca.gov/archive/gov39/wp-content/uploads/2018/09/9.10.18-Executive-Order.pdf>

<sup>5</sup> PRC 71350-713610 (2016) [https://leginfo.ca.gov/faces/codes\\_displaySection.xhtml?sectionNum=71354.&lawCode=PRC](https://leginfo.ca.gov/faces/codes_displaySection.xhtml?sectionNum=71354.&lawCode=PRC)

<sup>6</sup> ICARP Draft Resilience Metrics White Paper, March 25, 2022

- **Resilient Social Systems:** All people and communities respond to changing average conditions, shocks, and stresses in a manner that minimizes risks to public health, safety, and economic disruption and maximizes equity and protection of the most vulnerable,
- **Resilient Natural Systems:** Natural systems adjust and maintain functioning ecosystems in the face of change, and
- **Resilient Built Systems:** Infrastructure and built systems withstand changing conditions and shocks, including changes in climate, while continuing to provide essential services.

In May 2021, the US Climate Alliance held a series of workshops<sup>7</sup> for member states working to develop climate resilience metrics. The following themes were highlighted by working group participants:

- Use resilience priorities to inform metrics development.
- Define audiences and users.
- Build off existing metrics.
- Invest in data collection and staff.
- Commit to outcomes-based metrics.
- Center equity when measuring resilience.
- Embrace multiple start points, processes, and endpoints.

These themes helped to guide the development of a Draft Resilience Metrics White Paper that summarizes the findings of the ICARP Resilience Metrics Work Group (RMWG) which informed California’s 2021 Climate Adaptation Strategy update. ICARP’s Technical Advisory Committee (TAC) highlighted the need to build on this work by developing a “suite of comprehensive resilience metrics to help track progress and guide decision making across the state.” The following list of indicators incorporate findings from ICARP’s RMWG and their Interagency Resilience Work Group (IRWG), as well as the US Climate Alliance’s resilience metric workshops:

- **Social System Climate Resilience Indicators**
  - Socioeconomic, demographic, and climate exposure data determine climate vulnerability<sup>8</sup>.
  - Climate vulnerable communities participate in adaptation efforts through meaningful, informed, and long-term engagement.
  - Housing, transportation, and/or land use plans, policies, and investments consider the needs of climate vulnerable communities.

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<sup>7</sup> US Climate Alliance resilience metrics workshop summary included in Draft ICARP Resilience Metrics White Paper.

<sup>8</sup> ICARP’s TAC adopted the following definition in 2018, “climate vulnerability describes the degree to which natural, built, and human systems are at risk of exposure to climate change impacts. Vulnerable communities experience heightened risk and increased sensitivity to climate change and have less capacity and fewer resources to cope with, adapt to, or recover from climate impacts. These disproportionate effects are caused by physical (built and environmental) social, political and/or economic factor(s), which are exacerbated by climate impacts. These factors include, but are not limited to, race, class, sexual orientation and identification, national origin, and income inequality.” Defining Vulnerable Communities in the Context of Climate Adaptation, July 2018, [https://opr.ca.gov/docs/20180723-Vulnerable\\_Communities.pdf](https://opr.ca.gov/docs/20180723-Vulnerable_Communities.pdf)

- Equity and climate resilience are co-embedded in state investments.
  - Climate action plans and policies address health and equity.
  - Federal, state, regional, and tribal climate adaptation goals and plans are aligned.
  - Resources and funding are provided to jurisdictions for implementation of resilience projects and are equitably allocated to and for climate vulnerable communities.
  - Climate-related impacts on health, industries, and economies are measured, understood, and addressed.
  - Open space and natural places are accessed equitably.
  - Communities have strong social cohesion, trust, and social capital.
- **Built System Climate Resilience Indicators**
    - Critical lifeline services and facilities, as well as transportation and water infrastructure, are accessible and reliable before, during and after climate-related disasters/events.
    - Continuity and restoration of services following planned, or climate-/weather induced disruptions is equitable.
    - Emergency response services before, during, and after climate-related disasters/events are equitable.
    - Critical infrastructure is resilient to climate impacts throughout the duration of its useful life.
    - Plans, codes, ordinances, resolutions address climate risk and climate adaptation.
    - Californians have equitable access to sustainable and resilient housing.
    - Nature-based solutions are implemented in the built environment.
    - Climate mitigation (greenhouse gas reduction) aligns with climate adaptation.
- **Natural System Climate Resilience Indicators**
    - Nature-based solutions benefit natural and working lands.
    - Biodiversity and climate impacts and events on natural lands are measured, understood, and addressed.
    - Habitat and species are restored and preserved.
    - Ecosystem functions and natural processes are maintained.
    - Ecosystems, wildlife, and working lands adapt to and recover from climate stressors and impacts.

These indicators are still in draft form and are meant to provide state and local agencies with examples of how the resilience of social, natural, and built systems could be measured at the state level and by local communities in California. TRPA should consider how terms such as “climate vulnerable communities” and “critical infrastructure” used in specific indicator examples could be defined to ensure that the performance metrics tied to these indicators consider unique local challenges, opportunities, and existing definitions. For example, “critical infrastructure” in the Tahoe Basin would likely include



transportation and energy infrastructure critical for residents and visitors in the event of wildfires, extreme heat events and floods.

The ICARP RMWG’s resilience metrics initiative and the above indicator examples, informed California’s 2021 update to the CA Climate Adaptation Strategy, which is mandated by AB 1482 (Gordon, 2015) and outlines six climate resilience priorities for state and local agencies which are aligned with the indicators above:

#### **California Adaptation Strategy Priorities**

- Strengthen Protections for Climate Vulnerable Communities
- Bolster Public Health and Safety to Protects Against Increasing Climate Risks
- Build a Climate Resilient Economy
- Accelerate Nature-Based Climate Solutions and Strengthen Climate Resilience of Natural Systems
- Make Decisions Based on the Best Available Climate Science
- Partner and Collaborate to Leverage Resources

The California Adaptation Strategy is organized as a interactive dashboard<sup>9</sup> that can be navigated by priority or region and includes an implementation progress report. Each priority has specific goals and actions that are then tracked based on “progress indicators” such as “underway” or “nearing completion”. These actions also include specific “success metrics”, timeframes and lead agencies so audiences can understand how each action is being implemented.

California’s Natural Resources Agency released the state’s Natural and Working Lands Climate Smart Strategy<sup>10</sup> (Strategy) in 2022 to provide direction, targets, and an action plan to realize the benefits and opportunity inherent in increasing the health of natural and working lands to achieve climate mitigation, sequestration, and resilience goals. The Strategy defines California’s eight distinct natural and working landscapes and outlines options to track progress in restoring ecological health within these landscapes. The Strategy outlines potential indicators that could be used to travel nature-based climate action and measure progress. Indicators are organized into six categories, examples of a few of the indicators in each category are listed below:

- **Ecosystems Carbon and GHG Indicators**
  - (Increase in) metric tons of carbon stored in lands or metric tons of carbon dioxide equivalent sequestered or avoided as emissions.
- **Ecological Indicators**

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<sup>9</sup> See Examples section below for more information on the California Adaptation Strategy dashboard.

<sup>10</sup> The development of the strategy was driven by Governor Newsom’s executive order N-82-20 which highlighted the importance of restoring nature and landscape health to achieve climate, health, and equity goals across California, as well as the state’s Scoping Plan and Climate Adaptation Strategy.

- Percent decrease in ambient temperature during high heat months in urban areas, in particular in vulnerable communities.
- Percent change (increase) in soil organic matter.
- **Economic Indicators**
  - Number of high roads jobs<sup>11</sup> created or maintained.
  - New investments motivated by nature-based climate solutions.
- **Infrastructure Indicators**
  - (Increase in) soil water holding capacity.
  - (Increase in) compost infrastructure capacity.
- **Social Justice/Equity Indicators**
  - (Increase in) number of acres managed, co-managed, transferred to, and owned by California Native American tribes.
  - (Increase in) number of nature-based solutions implemented in climate-vulnerable communities.
- **Public Health Indicators**
  - (Increase in) acreage of lands used for community/urban farms.
  - (Increase in) food security.

The state’s Strategy also includes recommendations to help accelerate and scale this work in the near term. California acknowledges the need to “provide technical resources for data collection and tracking” and to “conduct comprehensive analysis on potential future land management actions and their multiple benefits.” Making this type of technical support and guidance accessible to multiple government and non-government partners to help identify and track performance metrics for these indicators will be key to successfully implementing the state’s strategy. While the state acknowledges that additional guidance and technical resources are needed to effectively track progress against these indicators, local and regional agencies like TRPA should review these indicators to consider whether any of them are relevant to scale to a local level to track progress towards local natural and working lands and/or carbon sequestration goals. Importantly, as with all indicators, agencies like TRPA should consider potential social, and economic trade-offs when prioritizing specific natural systems indicators over others.

### Resilience Indicator Development in Nevada

In 2020, the state of Nevada released its State Climate Strategy<sup>12</sup> which outlines three overarching goals for Nevada:

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<sup>11</sup> In the 2021 California legislative session, the first statutory definition of “high road” was introduced into the state’s Insurance Code Section 14005 which defines high road as “a set of economic and workforce development strategies to achieve economic growth, economic equity, shared prosperity and a clean environment.” The Natural and Working Lands Climate Smart Strategy is aligned with the “Putting California on the High Road: A Jobs and Climate Action Plan for 2030” plan which prioritizes the creation of high roads jobs in all climate planning.

<sup>12</sup> Nevada’s 2020 Climate Strategy is currently being updated and not accessible. Information including in this memo was derived from a presentation to the Nevada Senate Committee on Growth and Infrastructure in February 2021:

- Provide a framework for reducing Nevada’s GHG emissions across all economic sectors.
- Lay the groundwork for climate adaptation and resilience.
- Establish a structure for continued, ongoing climate action across the state.

The State Climate Strategy was informed by an extensive outreach and information gathering effort across 10 working groups and 15 state agencies and offices as well as a survey of Nevada counties and Carson City and multiple virtual listening sessions. One of the key takeaways from this outreach highlighted the need for the state of Nevada to expand inventory capabilities access to data in order to “support a comprehensive and consistent evaluation of GHG emissions reduction benefits from policies across the state” and noted that “the state could benefit from an integrated statewide GHG emissions inventory framework.”<sup>13</sup> The State Climate Strategy provides the foundation for the Nevada Climate Initiative.<sup>14</sup> The mission of the initiative is to ensure a healthy, vibrant, climate resilient future for all Nevadans with the specific goals of:

- Serving as a clearinghouse for all state-led climate initiatives.
- Coordinating Nevada Executive Branch agency policies and programs addressing climate change.
- Working cooperatively with city, county and federal representatives and other stakeholders.

## Examples of National, Regional and Local Climate Dashboards

The following profiles provide examples of dashboards created by state, regional and local government agencies that are intended to be used by both decision makers and public stakeholders. Most of these examples were built to communicate progress on a specific plan or strategy. These examples each include at least some of the following features that help provide a roadmap for specific audiences to navigate each dashboard.

### Key Dashboard Features

- **Clear use case and/or principles displayed on the homepage.**
  - This explains who the dashboard is for (primary audience) and how it can be used. This doesn’t limit other users from benefiting from the dashboard but instead clearly outlines why it was created which can help new users navigate the dashboard, regardless of if they are the primary audience.
- **Section on projected climate change impacts.**

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[https://goed.nv.gov/wp-content/uploads/2023/05/Presentation\\_Nevadas-State-Climate-Strategy\\_Bradley-Crowell\\_-Kristen-Averyt\\_David-Bobzien.pdf](https://goed.nv.gov/wp-content/uploads/2023/05/Presentation_Nevadas-State-Climate-Strategy_Bradley-Crowell_-Kristen-Averyt_David-Bobzien.pdf)

<sup>13</sup> Ibid

<sup>14</sup>[https://www.leg.state.nv.us/App/NELIS/REL/81st2021/ExhibitDocument/OpenExhibitDocument?exhibitId=47121&fileDownloadName=Presentation\\_Nevada%27s%20State%20Climate%20Strategy\\_Bradley%20Crowell\\_%20Kristen%20Averyt\\_David%20Bobzien.pdf](https://www.leg.state.nv.us/App/NELIS/REL/81st2021/ExhibitDocument/OpenExhibitDocument?exhibitId=47121&fileDownloadName=Presentation_Nevada%27s%20State%20Climate%20Strategy_Bradley%20Crowell_%20Kristen%20Averyt_David%20Bobzien.pdf)

- Including a section on projected climate impacts helps to provide context for the dashboard and creates an opportunity to make global climate impacts more relevant to a specific region and the people living and working in it.
- **Organized around goals, priorities and/or long-term outcomes.**
  - Effective dashboards are often organized around specific goals and priorities established by the hosting agency and these are often linked to a specific plan or initiative. This organizational structure helps the user make the link between indicators and metrics and long-term outcomes.
- **Calls to action related to goals and long-term outcomes.**
  - Providing users with guidance on what they can do to help reach the goals outlined in a dashboard is an effective way to engage specific audiences. This can be achieved by outlining specific actions on the dashboard providing the user with a link to other websites that provide this information.
- **Sitemap and search functions to help navigate and understand what is included.**
  - Dashboards that include a search function coupled with a site map provide a valuable starting point for users that want to find specific information quickly. This is especially key for users who plan to incorporate data from the dashboard into their day-to-day work.
- **Status updates include narrative explanation of next steps and key challenges.**
  - Dashboards can be difficult to update regularly so narrative explanations can provide insight into the challenges that might be involved in updating specific data regularly. Challenges related to specific policy actions related to dashboard goals can also be described to provide the user with more insight on knowledge gaps and potential funding needs.
- **Relationship between performance metrics, goals and policy actions is clear.**
  - Directly tying metrics and indicators to specific goals through narrative explanation can help the user understand what actions are being taken to make progress towards a specific goal and what the anticipated timeline is for reaching that goal.

## Dashboard Example Profiles

### 1) California Adaptation Strategy<sup>15</sup>

In 2021, California released its Adaptation Strategy as an interactive dashboard. The state's Adaptation Strategy links together multiple California state agency efforts focused on adaptation and building resilience and is organized around six key priorities. It also integrates key elements of other statewide

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<sup>15</sup> <https://climateresilience.ca.gov/>

sector specific plans such as the Climate Action Plan for Transportation Infrastructure, Wildfire and Forest Resilience Action Plan and the Natural and Working Lands Climate Smart Strategy.

Figure 2: California Adaptation Strategy Website Overview.



Figure 3: California Adaptation Strategy Priorities.



Relevance for Tahoe

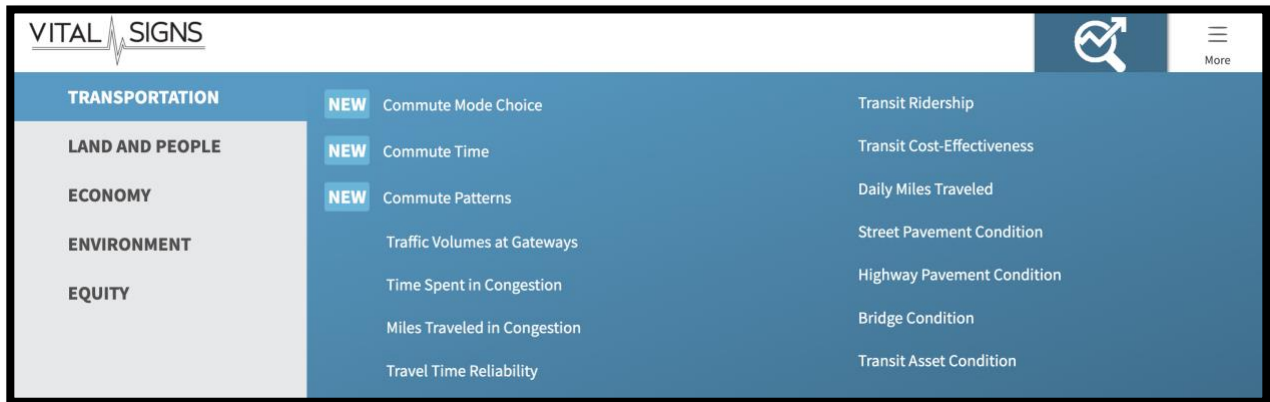
- Built for public stakeholders and decision makers but states clear goals and principles to explain their approach.

- Includes a section on projected climate change impacts (statewide) as well as a timeline of California’s climate adaptation policy work.
- Users can explore the site by priority or by clicking on one of nine different geographic regions to better understand region specific challenges and policies.
- Includes a search function to help users navigate and find specific data and information.

## 2) Vital Signs<sup>16</sup>

Vital Signs<sup>17</sup> is an interactive website managed by the Bay Area’s Metropolitan Transportation Commission (MTC) that tracks the Bay Area region’s performance across sectors including transportation, land use, the economy, and the environment. Vital Signs is an “initiative” with the goal of “helping us understand where we are succeeding and where we are falling short.” The primary audience for the dashboard includes staff at a number of partner regional agencies who can easily download the data and graphs available through the site to use in their own planning and efforts to communicate progress to their Council’s and Board’s of Directors.

Figure 4: Vital Signs Sectors and Indicators.



### Relevance to Lake Tahoe

- A clear use case is described up front by noting that “the Vital Signs website helps MTC, partner agencies, and residents of the Bay Area make informed decisions towards achieving policy goals” and asking users to “explore trends and visualize data.”
- A separate section on MTC’s specific transportation targets and each target includes graphs illustrating the status of efforts to reach the target.
- The site is organized into five categories including transportation, land and people, economy, environment and equity and lists indicators for each category. For each indicator, users can dive

<sup>16</sup> <https://www.vitalsigns.mtc.ca.gov/>

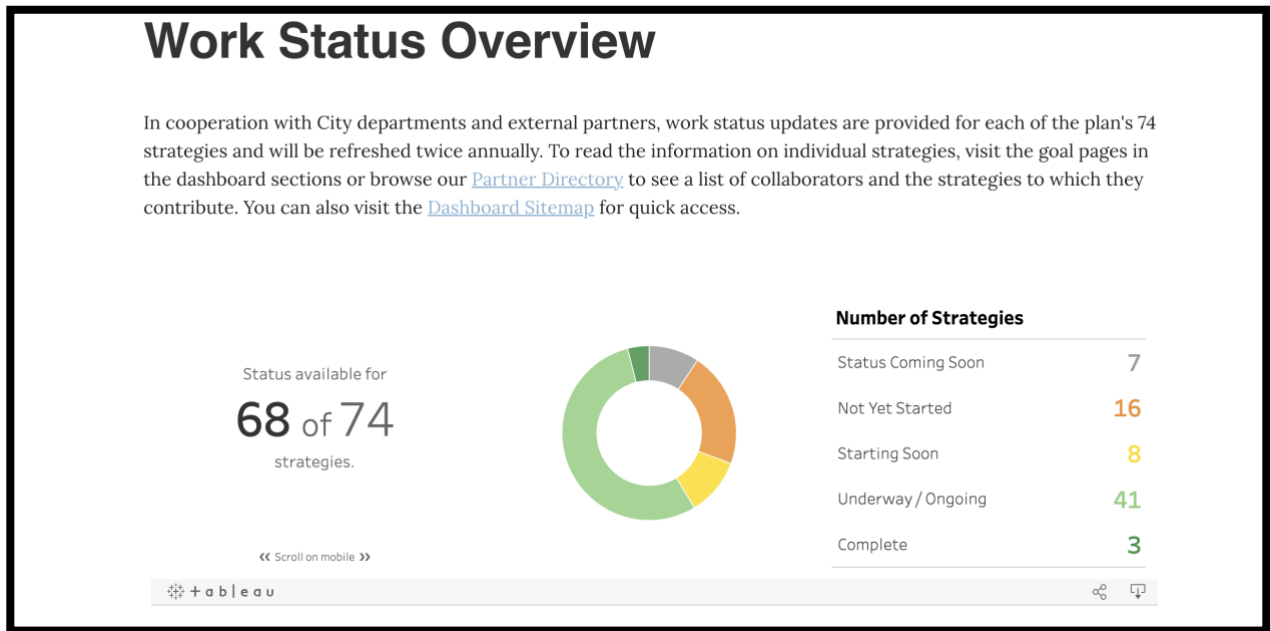
<sup>17</sup> A newly updated Vital Signs website is currently in beta release meaning the site is feature complete, but the team will be finalizing the site and refresh of indicator datasets throughout 2023.

deeper to understand current and historical trends and local, regional and national performance.

### 3) **Austin Climate Equity Plan**<sup>18</sup>

The Austin Climate Equity Plan Implementation dashboard was created to provide up-to-date, transparent information on the City’s progress in implementing the Climate Equity Plan. The dashboard shows progress on the City of Austin’s net-zero by 2040 target and provides status updates on the plan’s 74 strategies. The homepage provides context explaining why the dashboard was created and provides links to a partner directory as well as options to get involved whether you are an Austin resident, business owner, teacher or educator or local government staff.

Figure 5: Austin Work Status Overview.



#### Relevance to Tahoe

- Homepage provides a clear explanation of the goals and intended users for the dashboard and notes how often the dashboard will be updated (twice annually). There is also a dashboard sitemap to help users navigate the dashboard.
- Organized into five sections that then outline goals, work status summary and strategy updates as well as relevant equity themes and partners. Each goal also includes “what’s next” and “challenges and other considerations” narrative sections. These sections outline challenges like

<sup>18</sup> <https://www.vitalsigns.mtc.ca.gov/>

lack of staffing or lack of information and make it clear that these are the barriers to implementation (as opposed to lack of funding).

- The site includes a “work status overview” section which outlines the status of 68 of the 74 strategies noting whether they are not yet started, starting soon, underway, or complete.

#### 4) Keep Truckee Green<sup>19</sup>

The Town of Truckee’s sustainability dashboard is geared towards public stakeholders and organized into three sections outlining current actions, calls to action and progress indicators. The site is intended to support, guide, and track the Town’s comprehensive environmental efforts. The site is easy to navigate but the most recent data within any of the indicator categories is 2020 so may not be updated regularly.

Figure 6: Town of Truckee Priority Sectors.



#### Relevance for Tahoe

- The site includes sections that clearly outline current actions (“what we are doing”) and track progress (“measurable success”). These sections are separate but related and are focused on informing Town residents through illustrating directional trends and explaining specific Town policies and programs.

<sup>19</sup> <https://www.keeptruckeegreen.org/measurable-success/>

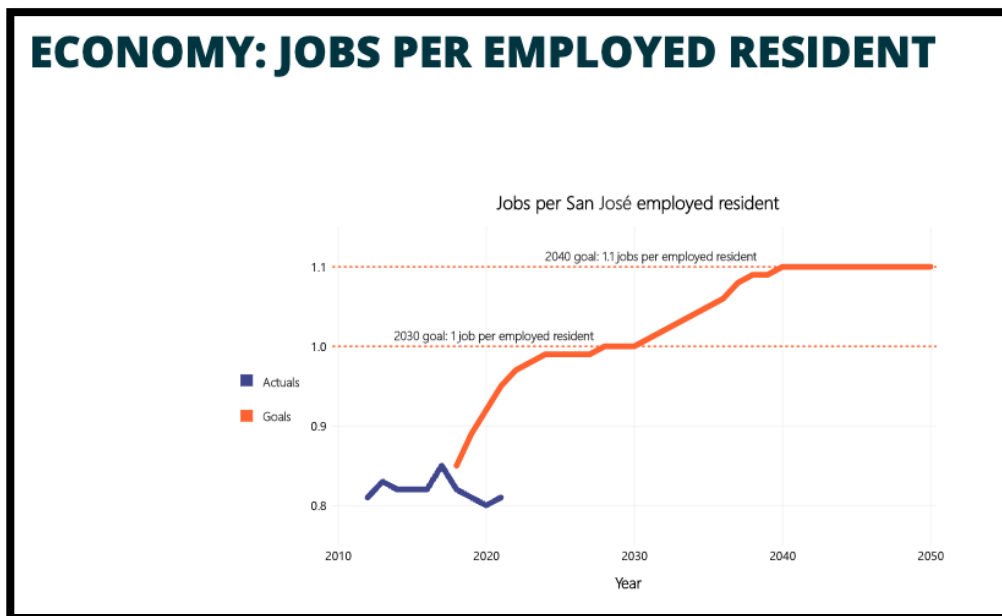


- Each sector includes specific performance metrics (e.g. under Trash & Recycling users can get data on trends in disposal and recycling rates) that reflect the Town’s priorities and goals.
- The third section of the dashboard is titled “what you can do” and provides specific calls to action which are largely limited to programs and resources provided by the Town of Truckee.

## 5) Climate Smart San Jose<sup>20</sup>

The Climate Smart San Jose dashboard was created to enable residents of the City of San Jose to track the city’s progress towards meeting their Climate Smart plan goals. The site is mobile friendly and provides links to dive deeper into the City’s nine key strategies, goals, and specific actions that residents can take to support climate action.

Figure 7: City of San Jose’s key performance metric to track economic progress.



### Relevance for Tahoe

- Call to action includes a challenge and “playbooks” for residents, businesses and local agencies for energy, mobility, and water.
- Each indicator includes an interactive graph showing actual progress and goals as well as a narrative explaining why it’s an indicator they are tracking.

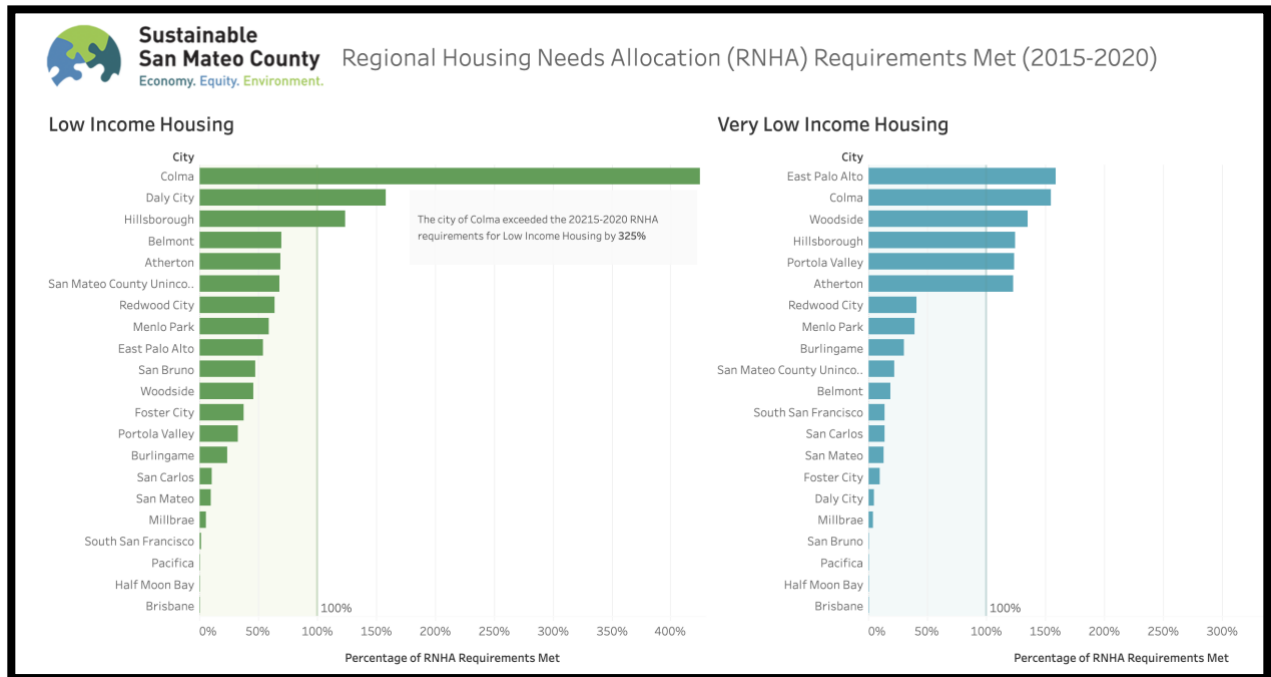
<sup>20</sup> <https://www.sanjoseca.gov/your-government/departments-offices/environmental-services/climate-smart-san-jos/climate-smart-data-dashboard>

- The site is transparent about specific challenges in that it notes that the city is not tracking progress on five indicators due to a lack of necessary data.

## 6) Sustainable San Mateo County<sup>21</sup>

This dashboard captures performance on 30 sustainability metrics for all 20 cities in San Mateo County and the county’s unincorporated areas in 10 categories: Agriculture and Food, Built Environment, Energy, Climate Action, Ecology and Biodiversity, Economy, Health and Well-Being, Social Equity, Transportation, Waste Management and Water.

Figure 8: Comparative graphs showing progress in providing low-income housing across San Mateo County jurisdictions.



### Relevance for Tahoe

- Provides an option for each city in San Mateo County to provide a narrative to explain results and provide context to reflect progress made ahead of County data collection to update the entire dashboard.

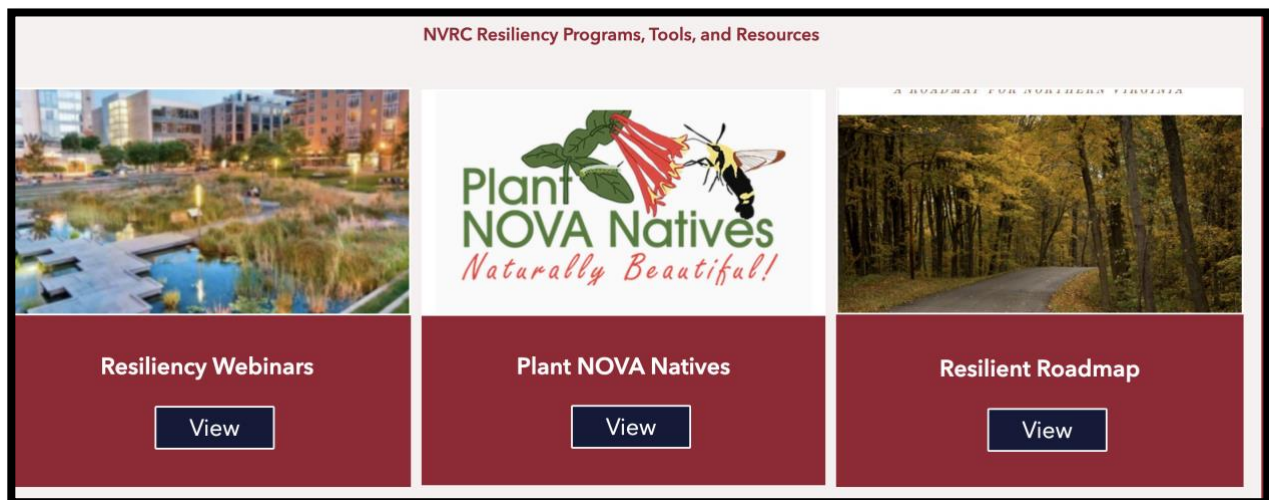
<sup>21</sup> <https://www.sanjoseca.gov/your-government/departments-offices/environmental-services/climate-smart-san-jos/climate-smart-data-dashboard>

- The dashboard homepage includes graphs showing sustainability progress on key performance indicators such as housing, transportation and residential water use by jurisdictions in San Mateo County.
- Dashboard states up front that “Data often lags behind the year it’s available, and the metrics shown represent results tallied in 2019, 2020 and 2021” which helps the user understand not only what data is available but when the next update will happen.

## 7) Northern Virginia Regional Commission Climate Resilience Dashboard<sup>22</sup>

The Northern Virginia Regional Commission (NVRC) Climate Resilience Dashboard is a regionally focused dashboard built to support policymakers, planners, and the public. The dashboard provides information on existing and future climate-related stressors impacting Northern Virginia to enable users to improve their resilience, compare and analyze existing data as well as modeled future projections of three climate indicators affecting Northern Virginia: heat, precipitation, and sea level rise. The dashboard is maintained by the Northern Virginia Regional Commission however they do not update all of the dashboard information regularly as the most recent data on indicators and trends is from 2017.

Figure 9: NVRC dashboard resources section.



### Relevance to Lake Tahoe

- The dashboard includes a resources tab that links to publicly accessible webinar series and related plans from NRVC as well as outside resources including a FEMA flood insurance rate map of the region.

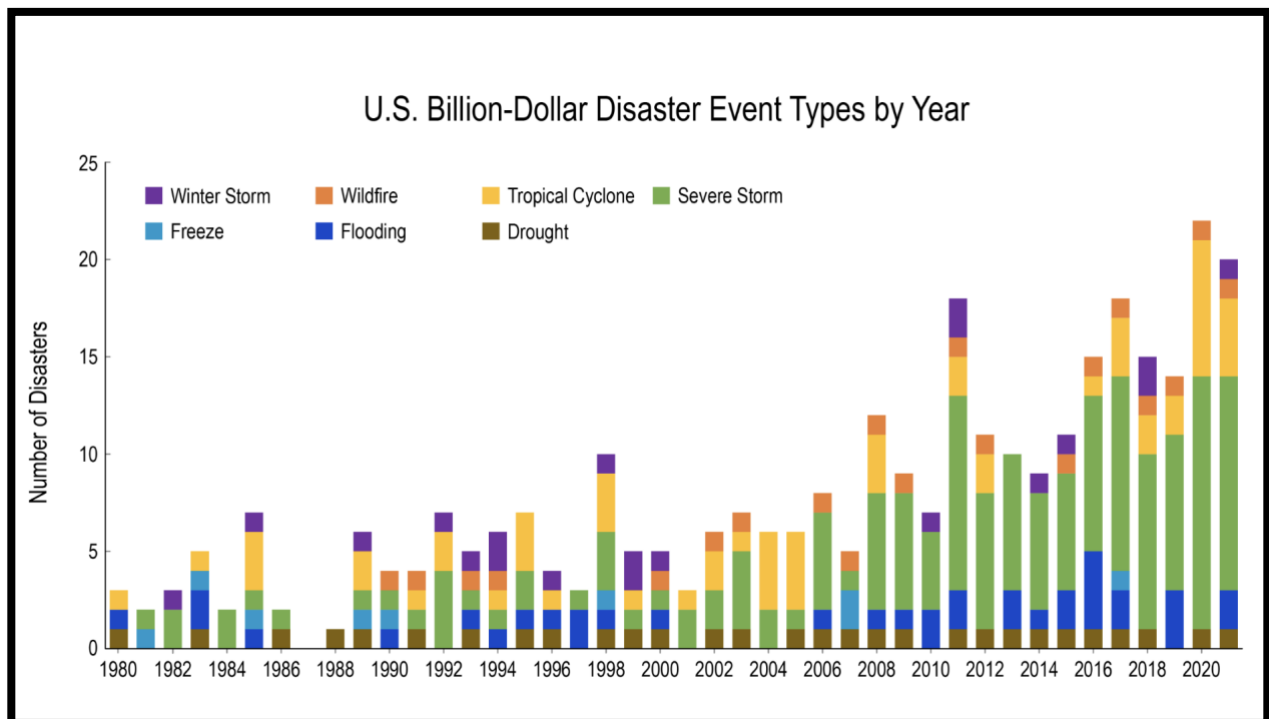
<sup>22</sup> [https://experience.arcgis.com/experience/d8319e3a2b5c42efa9dd241ddc0a0932/page/page\\_1/](https://experience.arcgis.com/experience/d8319e3a2b5c42efa9dd241ddc0a0932/page/page_1/)

- Users can navigate the dashboard by one of three climate “stressors” identified by NRVC; temperature, sea level rise and precipitation. Under each stressor, the user can click on “trends” to find out more about how this specific stressor is impacting the region. Some of the stressors also include more information on “projections” to help the user understand where the trends are heading.

## 8) USDA Office of Sustainability and Climate - Climate Change Indicators Story Map<sup>23</sup>

This story map was created through a partnership between the US EPA and the USDA Forest Service Office of Sustainability and Climate. The story map includes sections on climate change indicators and GHGs that explain to users how EPA and USDA are using specific climate change indicators and how and why they are tracking trends in GHG emissions. The map also includes sections showing trends across five categories tell the story of climate change impacts in the US; Weather and Climate, Oceans, Snow and Ice, Human Consequences of Climate Change and Adaptation and Resilience.

Figure 10: Graph displaying U.S. billion-dollar disaster event types by year from Human Consequences of Climate Change section.



<sup>23</sup> <https://storymaps.arcgis.com/collections/ad628a4d3e7e4460b089d9fe96b2475d?item=1>

#### Relevance to Lake Tahoe

- The approachable story map design is built for the public to easily navigate complex information. Each section includes graphics as well as a variety of links for users who want to dig deeper into the underlying data and resources.
- The section titled “Human Consequences of Climate Change” provides both narrative and visual explanations of the status of climate change through various disasters and their frequency (e.g., damage from wildfire, floods). The data outlined here are at the national level, but TRPA could provide a link to this site in its new Dashboard to help users easily access this data and to any unnecessary duplication.