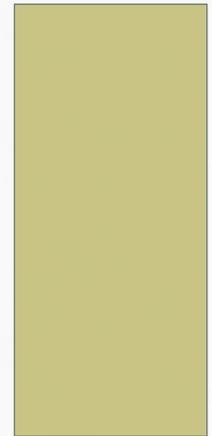




NWS CLIMATE SERVICES: NEW STRATEGIES FOR GPRA AND IMPACT-BASED MEASURES

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***NOAA/National Weather Service
October 29, 2015***



PURPOSE

- Provide you with information about the National Weather Service's (NWS) efforts to improve performance measures to more fully convey the value of our expanding services
- Focus on current efforts to improve performance measures in the NWS Climate Services program
- Obtain your input on strategies to assess the value of NWS Climate Services in helping decision makers

OVERVIEW

- Background
- Benefits of good metrics for NWS Climate Services
- Dual approach to improving Climate Services measures
- CPC current GPRA measure and proposed replacement
- Discuss initial efforts on an approach to creating impact-based climate measures
- Summary and Discussion

BACKGROUND

WHAT IS GPRA?

- Contrary to popular belief, “GPRA” does not stand for:
Get People Really Angry
- Government Performance and Results Act (GPRA), a law enacted in 1993, requires federal agencies to establish standards measuring their performance and effectiveness
- Why? To address a broad range of concerns about government accountability and performance
- Goal of GPRA is to improve effectiveness by promoting a strong focus on results, service quality, and customer satisfaction
- In part, requires the NWS to report a set of metrics to Congress to reflect how well we are meeting our mission goals and is linked to our budget

BACKGROUND

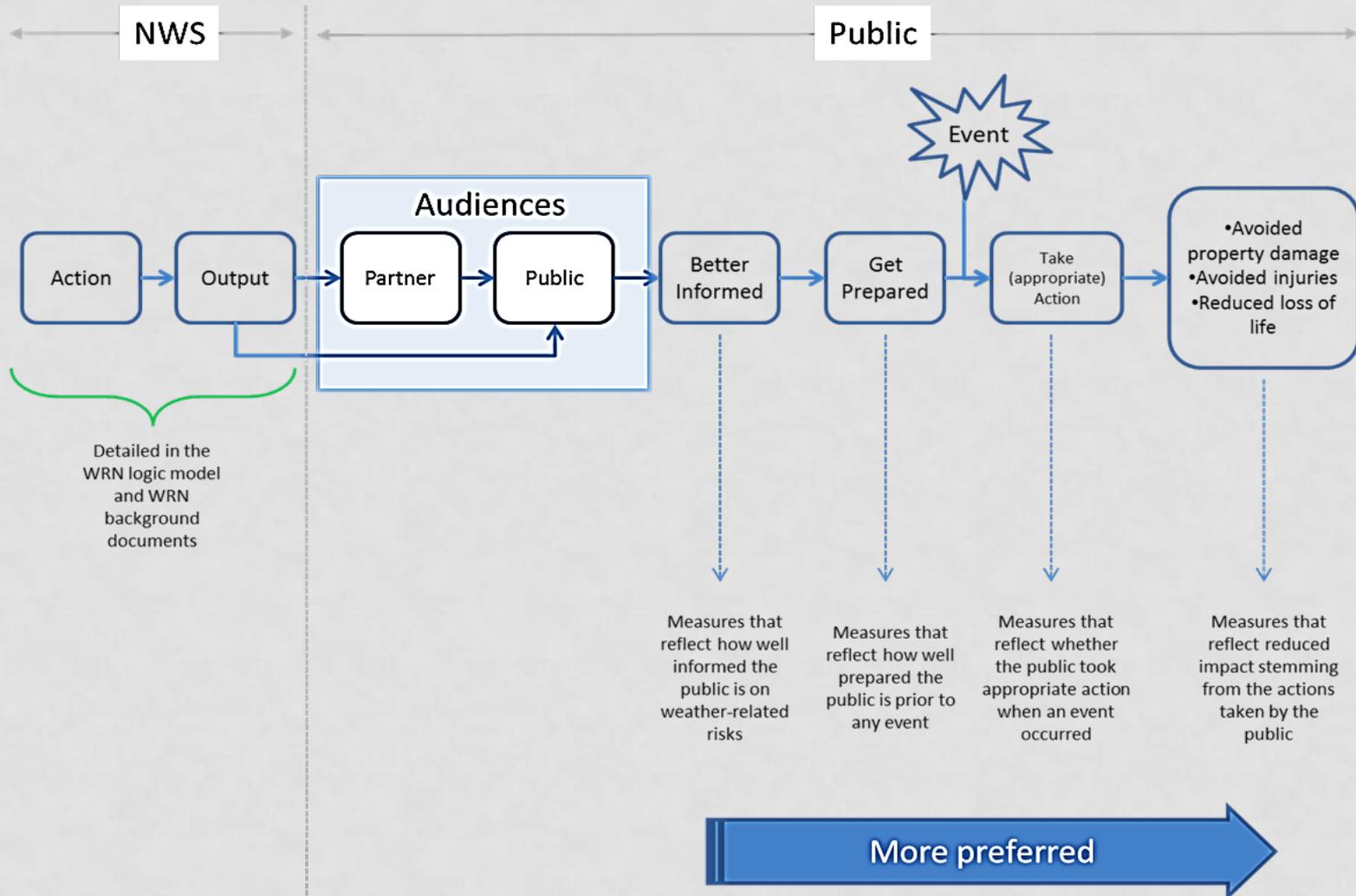
TRANSFORMING PERFORMANCE MEASUREMENT FOR A WEATHER-READY NATION



- The National Weather Service (NWS) is transforming its services in support of building a Weather-Ready Nation (WRN).
 - WRN is about building community resilience in the face of increasing vulnerability to extreme climate, weather, and water events
- Corresponding need to measure and track performance across all primary NWS national programs—mainly to show that these programs are benefiting society
- Performance and Evaluation Branch is working across eleven service areas to modify and develop new measures—NWS Climate Services is a component of the WRN performance measure improvement effort

BACKGROUND

SIMPLIFIED LOGIC MODEL FOR DEVELOPING SOCIETAL IMPACT PERFORMANCE MEASURES IN NWS



BACKGROUND

PILOT SOCIETAL IMPACT PERFORMANCE MEASURES

Metric Category	Data Source for Pilot Data Collection	Weather Events Covered Under Pilot Data Collection
Better Informed	<ul style="list-style-type: none">• NWS continuous website pop-up survey• Survey data collection from online panels	<ul style="list-style-type: none">• Flash floods• Winter weather
Get Prepared	<ul style="list-style-type: none">• NWS continuous website pop-up survey• Survey data collection from online panels	<ul style="list-style-type: none">• Flash floods• Winter weather
Take Action	<ul style="list-style-type: none">• Survey data collected by Eastern Research Group (ERG) following warnings issued by NWS	<ul style="list-style-type: none">• Flash floods• Extreme heat• Tornado• Severe thunderstorms
Avoided Injuries	<ul style="list-style-type: none">• Monthly Storm Reports from Weather Forecast Offices combined with Census Bureau data	<ul style="list-style-type: none">• Severe thunderstorms• Flash floods• Winter weather

IMPROVING CLIMATE PERFORMANCE MEASURES: A DUAL APPROACH

Replace the current Climate Prediction Center (CPC) GPRA measure with a new measure that reflects performance for a wider range of products and services.



Create an impact-based climate measure to reflect the societal benefits of NWS Climate Services.

More fully represent value of NWS Climate Services to support decision makers

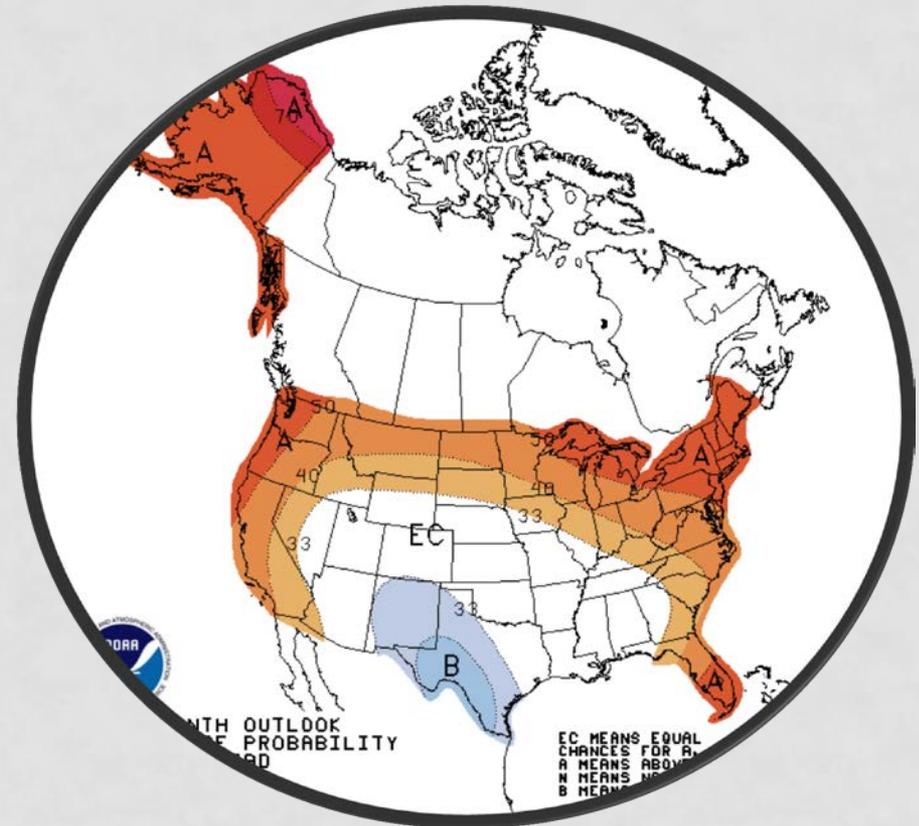
BENEFITS OF GOOD METRICS FOR NWS CLIMATE SERVICES

- ✓ Provide a history of Climate Services performance
- ✓ Indicate strengths and weaknesses in Climate Services
- ✓ Provide visibility to the program
- ✓ Provide focus for future Climate Services
- ✓ Produce good internal and external public relations through transparency
- ✓ Help improve climate forecasting and decision support services
- ✓ Help leadership make informed decisions
- ✓ Convey the value of climate products and services

CPC GPRA METRIC

CURRENT METHODOLOGY

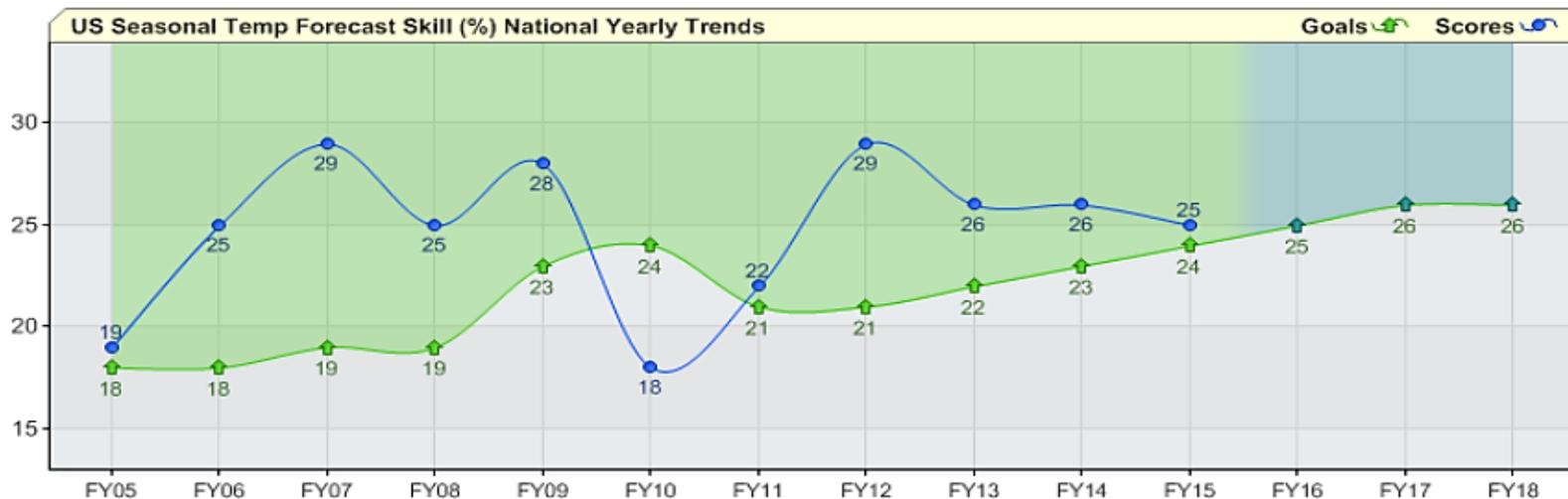
- For each 3-month period, CPC issues seasonal outlooks for U.S. surface temperature.
- Reported as either **above normal (A)**, **near normal (N)**, **below normal (B)** or, where no definite seasonal guidance can be provided, **equal chances (EC)**.



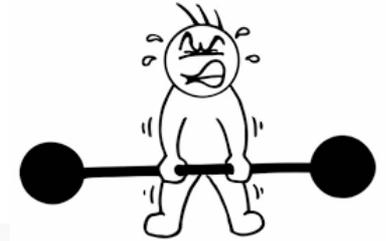
CPC GPRA METRIC

CURRENT METHODOLOGY

- Heidke Skill Score (HSS) computed for each 3-month seasonal mean (JFM mean, FMA mean, MAM mean, etc.)
- HSS (x100) represents the percent improvement by the CPC forecaster over the number of forecasts that are correct by chance
- Measure is averaged over the most recently available 48 months



CPC GPRA METRIC WEAKNESSES



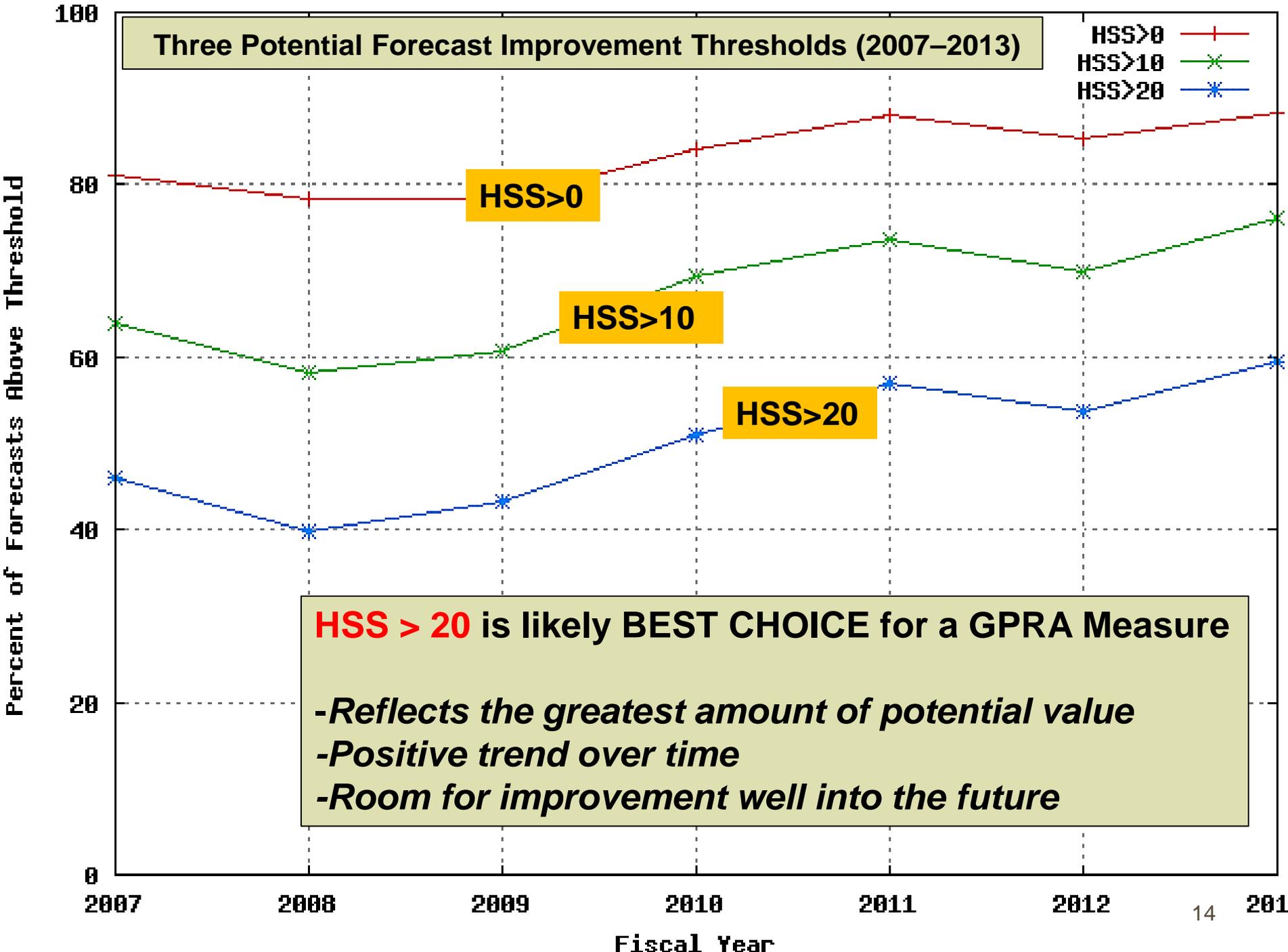
This GPRA Measure...

- **Doesn't reflect breadth of CPC climate forecast products/services.**
 - CPC issues more than 1000 products annually and the metric measures less than 1% of CPC's total outlooks
- **Computed only once per month for one of CPC's operational forecasts**
 - CPC issues over 100 products monthly
- **Compares current year to one from 5 years ago**
 - Poor perception about current skill can result if that previous year score was unusually high

CPC GPRA METRIC PROPOSED REPLACEMENT



- Base new metric on all CPC extended range (6-10 and 8-14 day) and long range (monthly and 0.5 month lead seasonal) outlooks
- New metric will include over 1000 product issuances per year
- Judged “Useful” if its HSS exceeds an agreed upon threshold
- Calculation would consist of counting all CPC outlooks as either “Useful” if they exceed the threshold or “Not Useful” if they meet or fall short of the threshold
- Determine the percent of all “Useful” forecasts
 - Range of potential values > 0 to 100 (unit = percent)



PROPOSED NEW GPRA METRIC

- A CPC forecast is judged “Useful” if its HSS is >20 (improvement over a random/chance forecast)
- Calculation would consist of counting all CPC outlooks as either “Useful” ($HSS > 20$) or “Not Useful” ($HSS \leq 20$)
- Performance Metric = Percent of all CPC forecasts deemed “Useful”
- Target TBD, but at a glance, the initial target for percent of “Useful” products would likely begin near 60

IMPACT-BASED CLIMATE MEASURE

COMPLETING THE PERFORMANCE PICTURE

- **Goal**

- Create an impact-based performance measure that supplements the HSS and helps convey the value and progress of NWS Climate Services to its users

- **Simplified Approach (proposed)**

1. Identify climate services users from a cross-section of established economic sectors and subsectors (develop a priority/feasibility list)
2. Use survey methods to obtain regular feedback for calculations and test potential performance measures
3. Select a meaningful measure, establish baseline, & create a target
4. Determine a method to establish the linkage between improved predictions and increased value

IMPACT-BASED CLIMATE MEASURE

ASSESSING VIA ESTABLISHED ECONOMIC SECTORS

- **Sector 1:** Agriculture and Natural Resources (e.g., Farming, forestry, water resources)
- **Sector 2:** Manufacturing and Construction (e.g., auto and textile production, energy utilities, water management)
- **Sector 3:** Service Industries (e.g., transportation, tourism, entertainment, retail sales, insurance, healthcare, telecommunications)
- **Sector 4:** Education & Research (e.g., IT, government, scientific research, culture)
- **Sector 5:** Government and Industry Decision Makers (e.g., executive decisions for government, science, media)

NWS CLIMATE SERVICES DIVISION

SAMPLE TYPES OF QUESTIONS

- Sample questions that could be asked to begin developing baselines for various performance measures or a combined climate performance index score.
 - **(Frequency of Use)** How often do you use NWS climate products & services in your decision making?
 - **(Importance)** How many factors, including climate, do you use in your decision making? (1 or 2, 3-5, 6-10, more than 10)
 - **(Likelihood to Use)** Using a scale from 1 to 5, where 1 is Definitely Not and 5 is Definitely, what is the likelihood you will use NWS Climate Services in the future?

IMPACT-BASED CLIMATE MEASURE

POTENTIAL QUESTIONS

- **(Relative Importance)** How important is climate information compared to other factors in your overall decision making?
- **(Agreement)** Using a scale from 1 to 5, where 1 is strongly disagree and 5 is strongly agree, please rate NWS Climate Services on the following:
 - Helped me or my organization avoid financial loss
 - Helped me or my organization make better use of resources
 - Helped me or my organization avoid property damage
 - Helped me or my organization make better planning decisions

SUMMARY AND DISCUSSION



- NWS is exploring strategies for improved performance measures
- NWS proposes a dual approach to improving Climate Services measures
- NWS plans to replace current CPC GPRA Measure
- NWS would like your ideas and comments on creating impact-based Climate Services measures

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BACKUP SLIDES

CPC HEIDKE SKILL SCORE FORMULA

$$\text{HSS: } S = \left(\frac{c-e}{t-e} \right) \times 100$$

- **c** = number of grid points where forecast was correct
- **e** = number of grid points expected to be correct by chance alone
- **t** = total number of grid points where the forecast was made

Climate Prediction Center New GPRA Metrics

