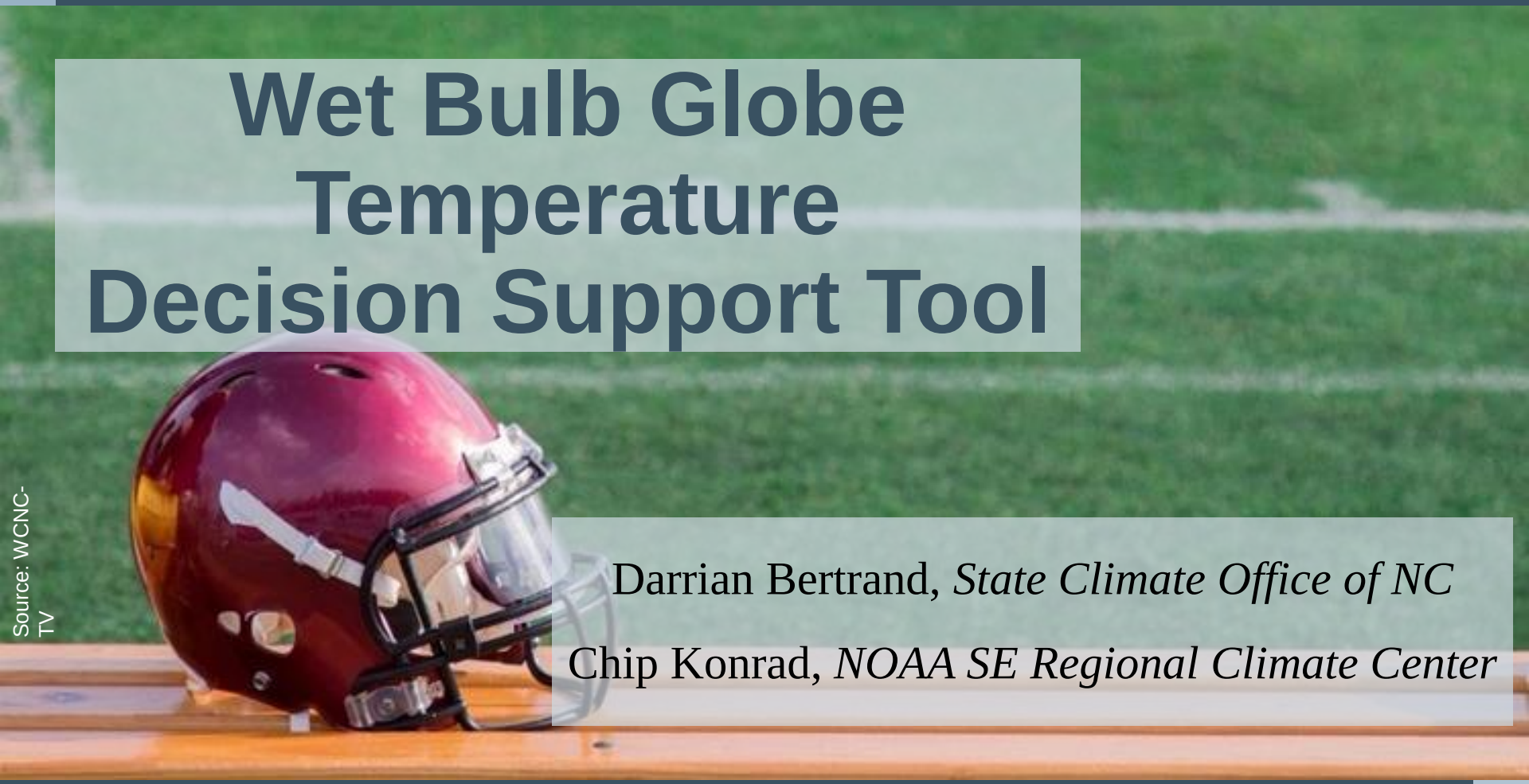
Wet Bulb Globe Temperature Decision Support Tool



Source: WCNC-TV

Darrian Bertrand, *State Climate Office of NC*

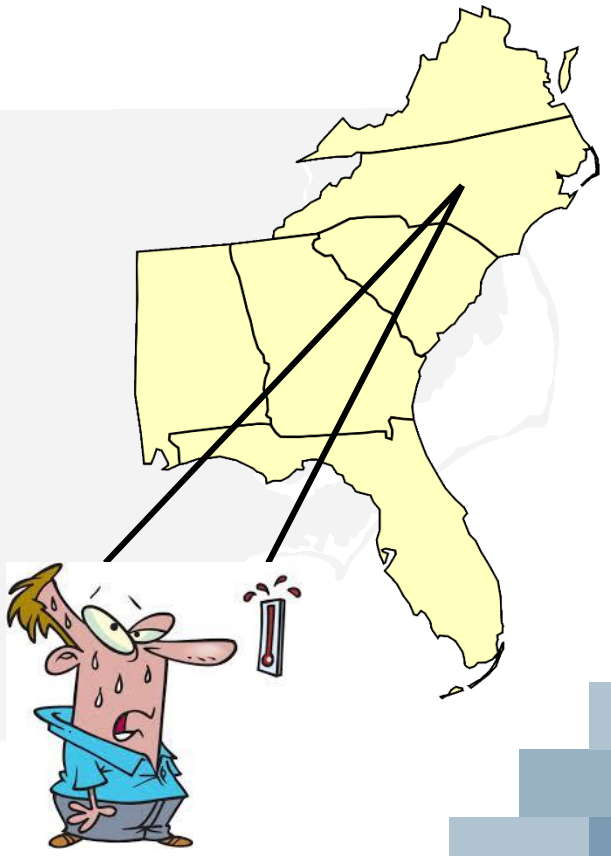
Chip Konrad, *NOAA SE Regional Climate Center*

NC STATE UNIVERSITY

NORTH CAROLINA CLIMATEOFFICE

Heat Stress in the Southeast

- 1,020 heat-related fatalities in the SE from 1996-2016
- Wet bulb globe temperature rated the standard measure for heat stress by the American College of Sports Medicine and U.S. Dept. of Defense
- WBGT:
  - Temperature, RH, wind speed, solar radiation → how do environmental conditions affect the human body?
  - Temperature measured in the sun
- Lack of WBGT monitoring



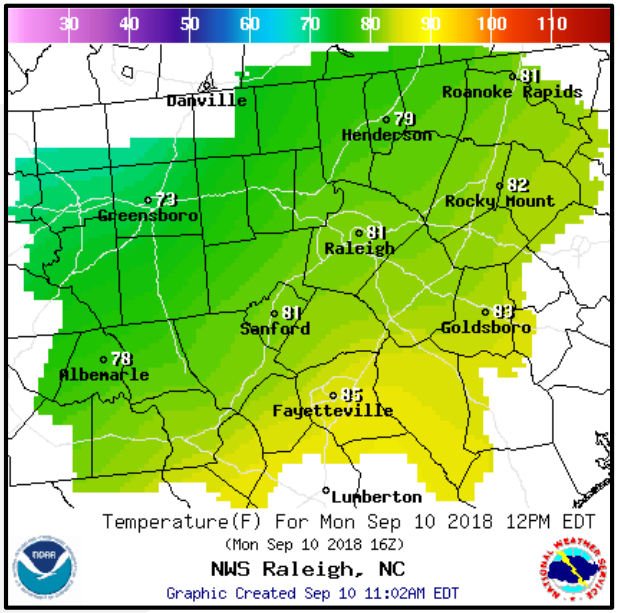
WBGT Decision Support Tool

- Collaboration between the State Climate Office of NC, the SE Regional Climate Center, and the Carolinas Integrated Sciences and Assessments
- Goal
  - Provide a publicly accessible tool of **hourly WBGT** that can be used to **mitigate heat stress** by making informed decisions about when to schedule exertional outdoor activities.
  - Provide guidelines for actions to take for WBGT risk categories
- End users
  - High school athletics
    - Adjust practice schedules based on heat threat through the week

Data

- 5-day hourly forecast:
  National Digital Forecast Database (NDFD)

- Past 24 hours:
  Real-Time Mesoscale Analysis (RTMA)



NDFD example from NWS Raleigh

Methods

$$WBGT = 0.7NWB + 0.2GT + 0.1DB$$

*NWB: natural wet bulb temperature, GT: black globe temperature, DB: dry bulb temperature

- Liljegren et al. 2008
  - Inputs: temperature, dew point temperature, wind speed, relative humidity, solar radiation, and pressure
- WBGT Sun and Shade Estimations
  - *Sun*: 0% cloud cover *Shade*: 100% cloud cover
  - Provides a range of WBGT values for the user
- Validation
  - WBGT estimations are being compared to measurements taken from Kestrels at 2 sites and an Extech HT30 at 1 site

Tool Example

- WBGT Decision Support Tool – Prototype

Example: 9/01/2018

Audience Feedback

- Were you aware of WBGT as a heat stress tool before this session?
- Is the tool's information easy to understand?
- Would a spatial component (map) of this tool be helpful for you to visualize the information across the region?
- Would you use this tool in your sector once it's applied to other user groups (the average citizen)?
- Do you have any suggestions for improvements?

Future Work

- Expand to the SE
- Incorporate other users and provide guidance
  - Children
  - Average citizens (acclimated and unacclimated to the heat)
  - Military personnel
- Provide a map of WBGT across the region

Acknowledgements

- Southeast Regional Climate Center (SERCC)

- Carolinas Integrated Sciences and Assessments

Thank you!

Contacts:

Darrian Bertrand
dmbertra@ncsu.edu
State Climate Office of NC

Chip Konrad
cek@email.unc.edu
SE Regional Climate Center