

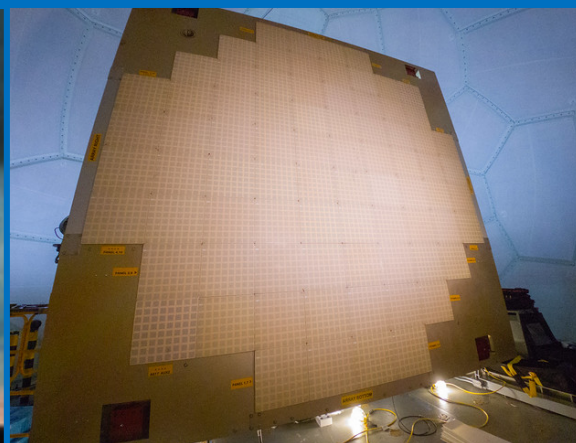
# DOC / NOAA / OAR National Severe Storms Laboratory

## 2021 NSSL Science Review

### *Organizational Excellence*

### *Science*

*Jack Kain Director, NSSL*





# Mission Statement

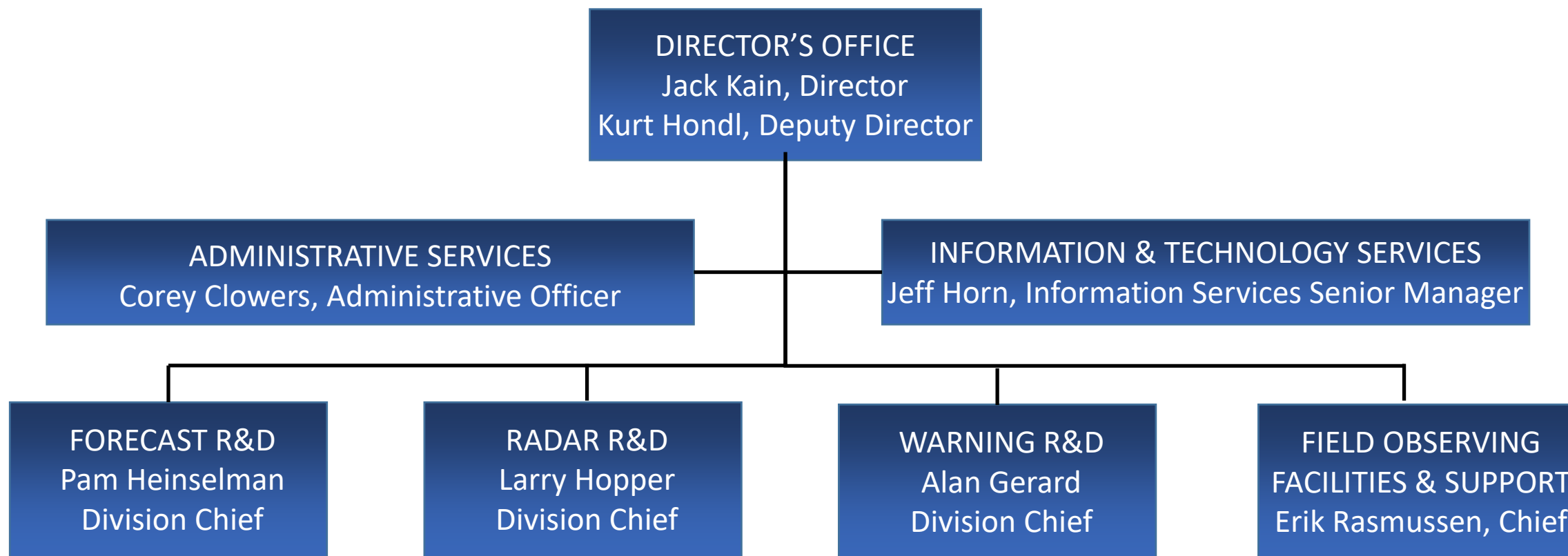
- We are the world's preeminent laboratory for observing, understanding, and modeling severe thunderstorms. We serve as a national resource for severe-weather research and we work collaboratively with the National Weather Service to ensure that their forecasters have the knowledge, capabilities, and technologies to remain world leaders in effectively communicating accurate, timely, and actionable forecasts and warnings of extreme weather to the public and commerce.

**NSSL: With you since 1964!**





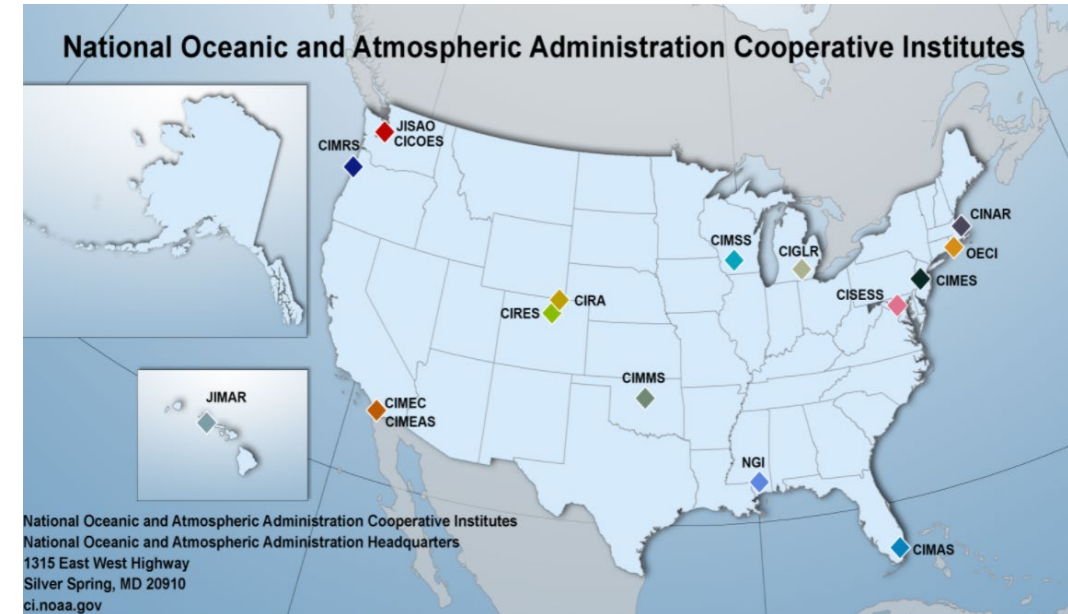
# NSSL Organizational Chart



# Scientists and Engineers at the NOAA-University of Oklahoma Cooperative Institute have been a fundamental part of NSSL research Efforts for over 40 Years

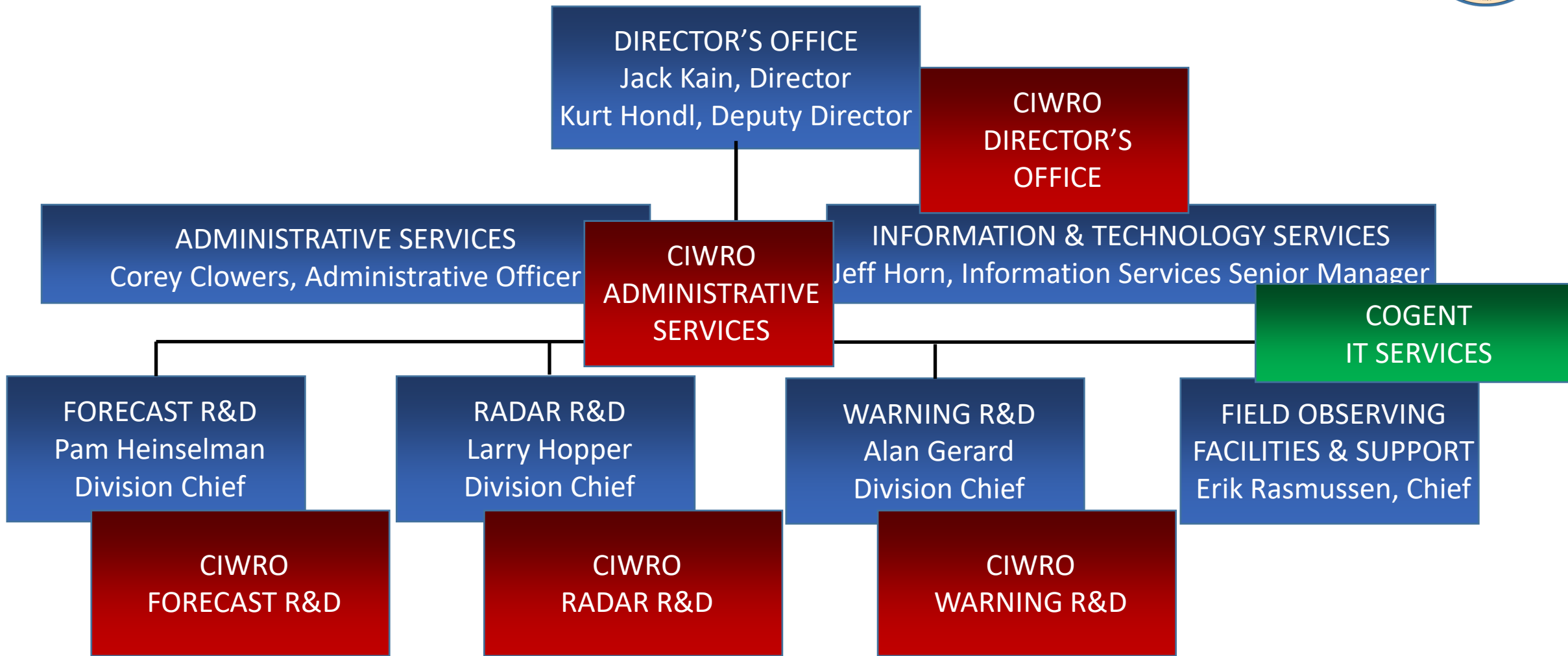


- 1978-September, 2021: Cooperative Inst. for Mesoscale Meteorological Studies (**CIMMS**)
- October 2021 - ?: Cooperative Inst. for Severe and High-Impact Weather Research and Operations (**CIWRO**)





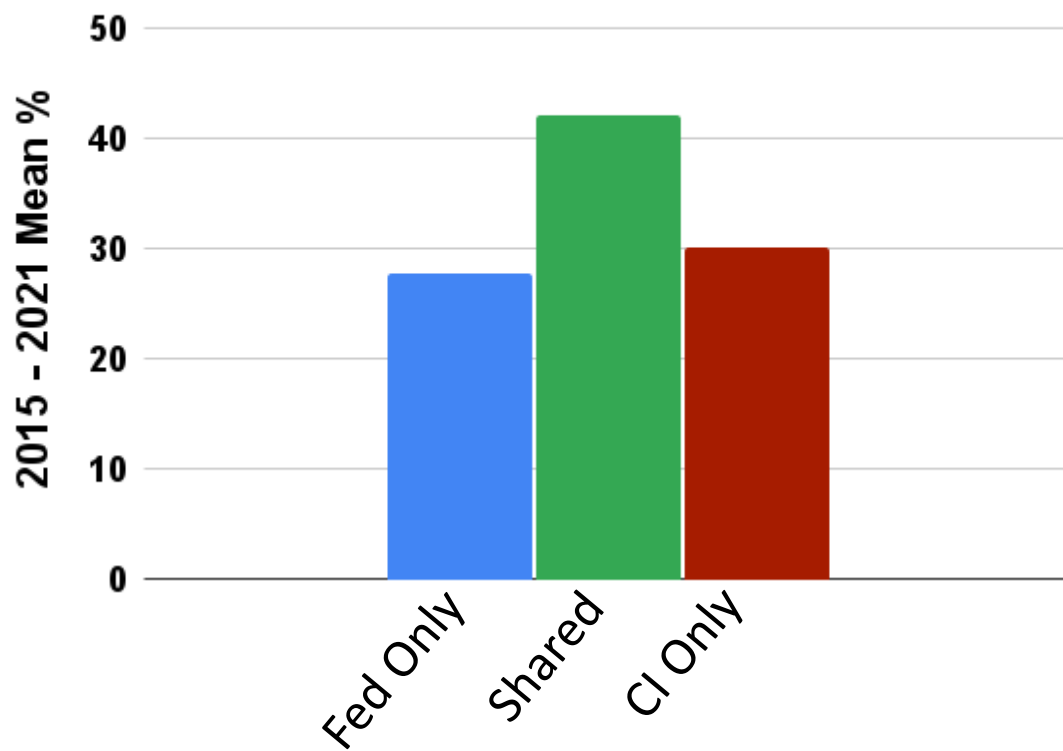
# Organizational Chart



# Quality: Publications per year (2015-2021)



Publication Authorship as a Function of Affiliation



Average

89

% of pubs with no CI authors

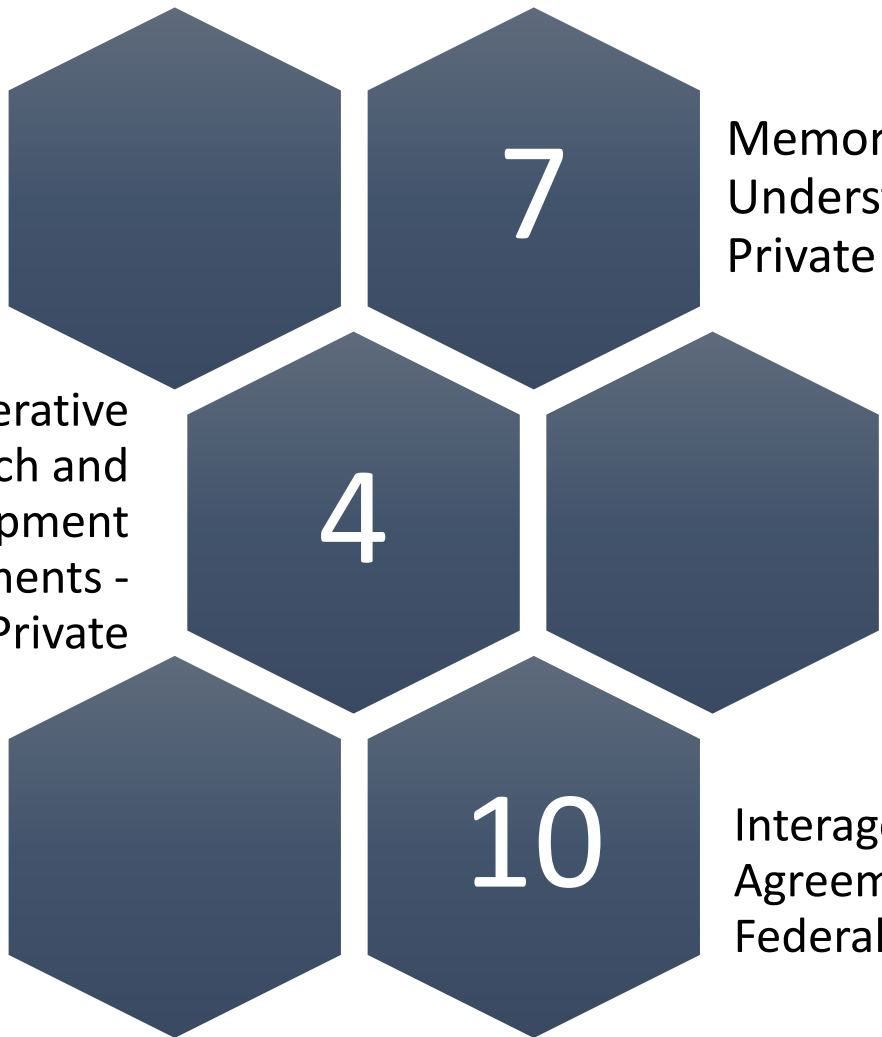
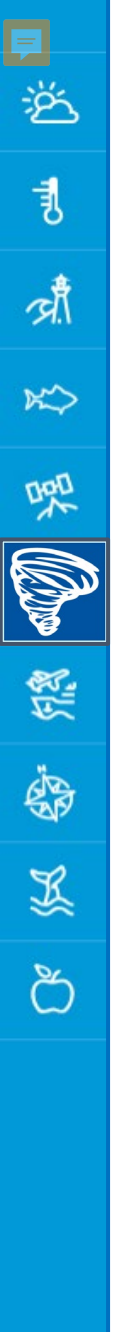
28

% of pubs with no Fed authors

30



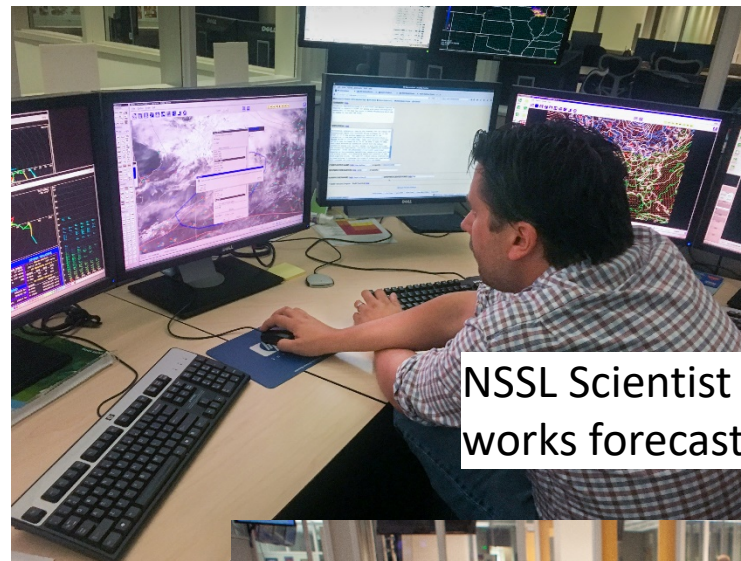
# Quality: Collaborations and Agreements



Memoranda of Understanding – Private and State

Cooperative Research and Development Agreements - Private

Interagency Agreements – Federal



NSSL Scientist Mike Coniglio works forecast shift for the SPC

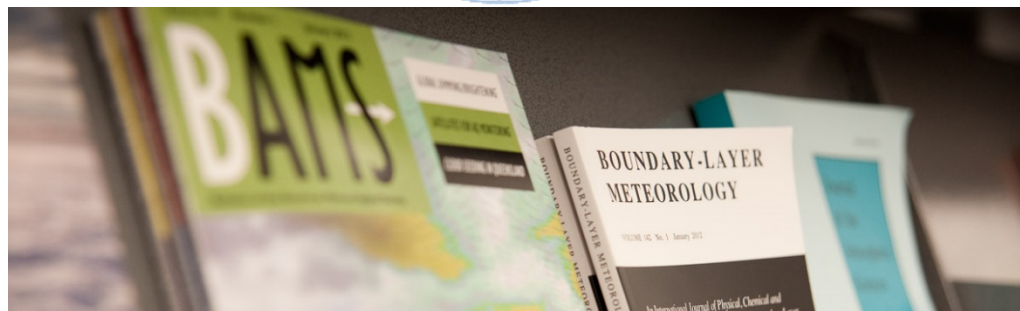


CIWRO/NSSL Scientist Pat Skinner works warning operations with the NWS Norman WFO





# Quality: Engagement and Service (2015-2021)



Harold Brooks chairs a Panel Discussion during the 2015 European Conference on Severe Storms

Photo by Chuck Doswell







# Quality: Awards (2015-2021)

## International Awards



- European Severe Storms Laboratory Nikolai Dotzek Award
- Chinese Academy of Sciences Institute of Atmospheric Physics: *Advances in Atmospheric Sciences Editor's Award*

## National Awards



- **Two** White House Presidential Early Career Award for Scientists and Engineers
- **Five** NOAA Distinguished Career Awards
- **Two** NOAA Administrator's Awards



- Department of Commerce Silver Medal
- NOAA Research EEO/Diversity Laboratory of the Year
- OAR EEO/Diversity Award for Exemplary Service
- Society of American Indian Government Employees (SAIGE) Leadership Award





# Relevance: Alignment with NOAA/OAR Science Goals



## NOAA Research and Development Priorities (2020-2026)

Reducing societal impacts from hazardous weather & other environmental phenomena	Sustainable use and stewardship of ocean and coastal resources	A robust and effective research, development, and transition enterprise
--	--	---

## OAR Strategic Goals (2020-2026)

Detect Changes in the Ocean and Atmosphere	Make Forecasts Better	Drive Innovative Science	Explore the Marine Environment
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## NSSL Strategic Goals (2021-2030)

Better observations and understanding	Better forecast/warning tools and techniques	Better resonance with users and stakeholders	Better foundational underpinnings
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# Relevance to the National Weather Service

## NWS Strategic Goals (2019-2022)

Reduce the impacts of weather, water, and climate events by transforming the way people receive, understand, and act on information.	Harness cutting-edge science, technology, and engineering to provide the best observations, forecasts, and warnings.	Evolve the NWS to excel in the face of change through investment in our people, partnerships, and organizational performance.
--	--	---

## • The Norman Weather Community is anchored by 4 NOAA National Centers:

- The designated National Centers for:
  - ❖ Severe Weather Research (**NSSL**)
  - ❖ NWS Severe Weather Prediction (**SPC**)
  - ❖ NWS Warning-Decision Training (**WDTD**)
  - ❖ NWS Radar Operations (**ROC**)

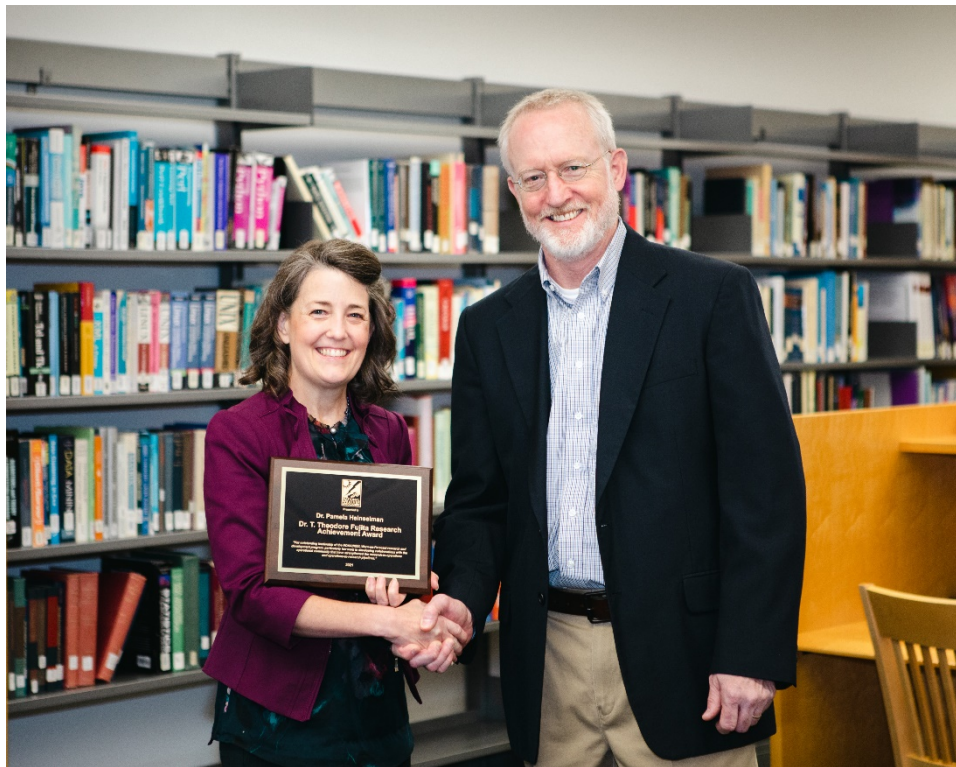


## • And an elite NWS local Forecast Office (OUN)

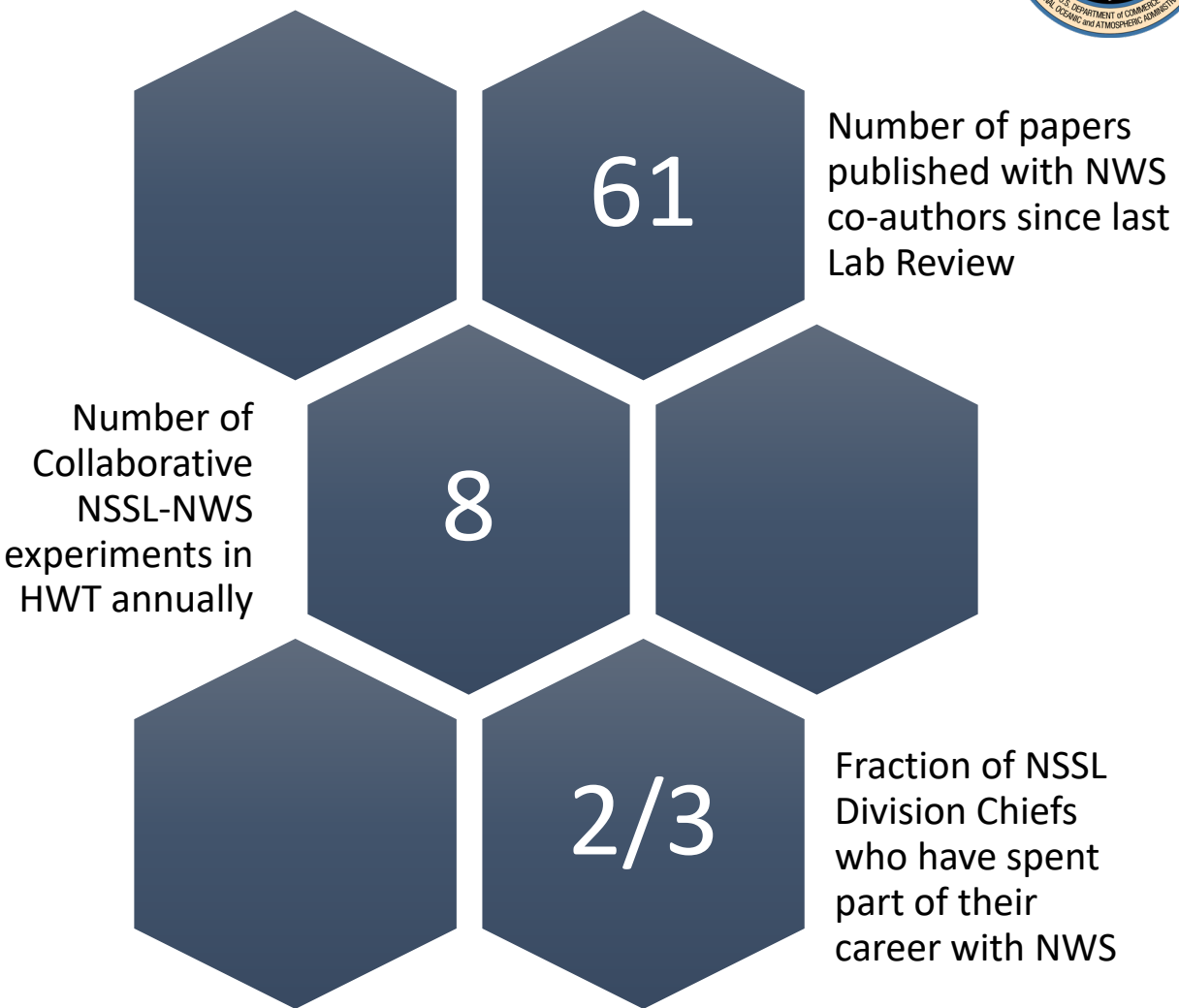




# Relevance to the National Weather Service

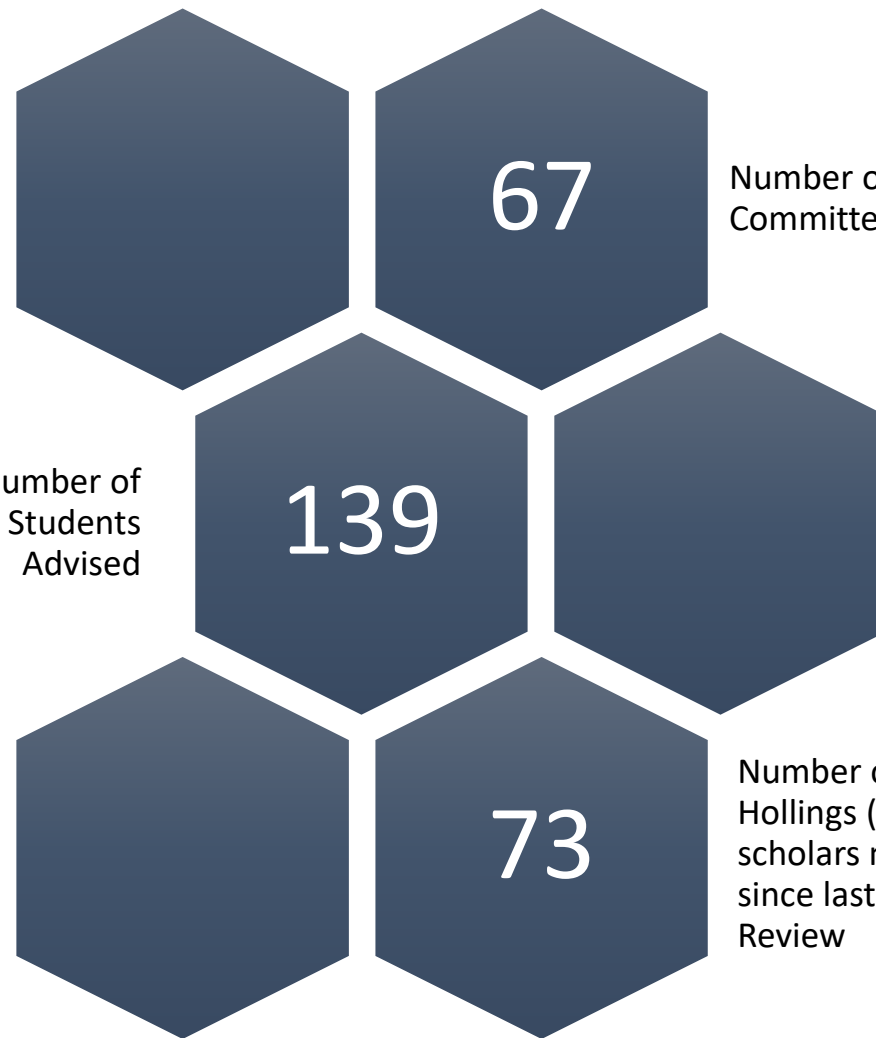
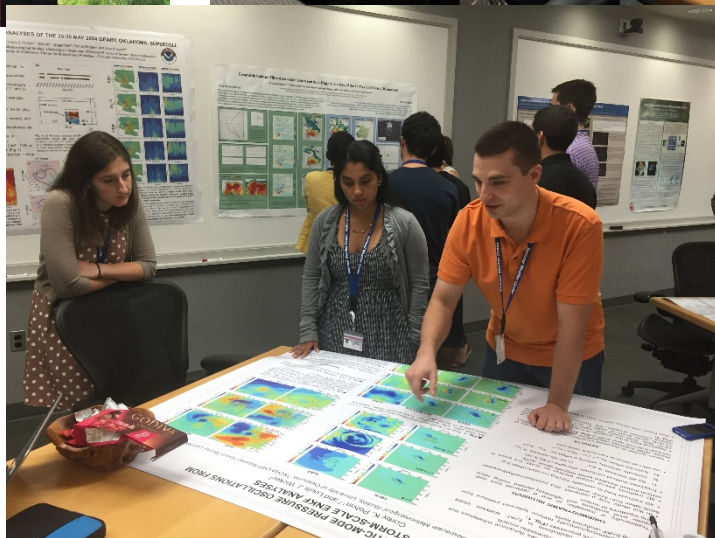


FRDD Chief Pam Heinselman has never been employed by the NWS but in 2021 she was awarded the prestigious National Weather Association's Dr. T. Theodore Fujita Research Achievement Award, which is presented to an NWA member whose research has made a significant contribution to operational meteorology.

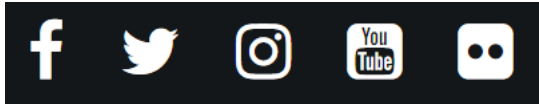




# Relevance to Education: 2015-2021 Numbers



# Relevance: Social Media



**NWS Shreveport** @NWSShreveport · Mar 4

Thanks to a collaborative survey with @NOAANSSL we discovered that the track was longer with the Vivian tornado on February 28th. Unmanned aerial surveys from a drone and a fixed-wing aircraft were helpful to extend the damage path length to 1.5 miles.

**NATIONAL WEATHER SERVICE SHREVEPORT, LA**

**Preliminary Damage Survey Results**

Vivian, LA	
Date	February 28, 2021
Time (Local)	6:15 PM – 6:18 PM
EF Rating	EF-1
Est. Peak Winds	90 mph
Path Length	1.50 miles
Max. Width	165 yards
Injuries/Deaths	None

**NWS New Orleans** @NWSNewOrleans · Nov 30, 2020

In just 2 days, Dec 2, you can chat with @NOAANSSL and ask questions about NSSL's mobile research vehicles

**NOAA National Severe Storms Laboratory** @... · Nov 30, 2020

Wednesday THIS week, Dec. 2., join us 1-2 pm CST for a #TwitterChat as @NOAA experts take your questions about NSSL's mobile research vehicles.

Follow @NOAANSSL & tag your questions with the hashtag #WeatherQA.



**OU Campus Safety** @OUemergencyprep · Aug 7, 2020

A quick THANK YOU to the talented professionals @NOAANSSL for making the #MRMS data viewer available! The viewer is a critical tool in making campus #OUsafe from weather threats.

**NWS Grand Forks** @NWSGrandForks · Oct 28, 2018

Always keeping an eye on the sky? So are we, but we need your help! The #mPING app lets you send your weather reports to the NWS to help us make a better forecast!

**NOAA NCEI Climate** @NOAANCEIclimate · Oct 28, 2018

Learn more about the #mPING project, managed by @NOAANSSL, which crowdsources weather reports via a free smartphone app: mping.nssl.noaa.gov #CSWGlobal18

**National Weather Ctr** @NWCNorman · Mar 4

Always so many incredible research projects going on inside the building, here is just one of the many at the NWC... with @NOAANSSL and @OUCIMMS! #WeatherResearch #SpringSafety

**University of Oklahoma Research** @OUResearch · Mar 3

Researchers from @UofOklahoma and @NOAANSSL are improving current software to enhance guidance for the categorization of flash flood warnings to increase public response and public safety. Learn more at bit.ly/FlashFloods21



# Performance: We are effective Stewards of Taxpayer money

## • Examples:

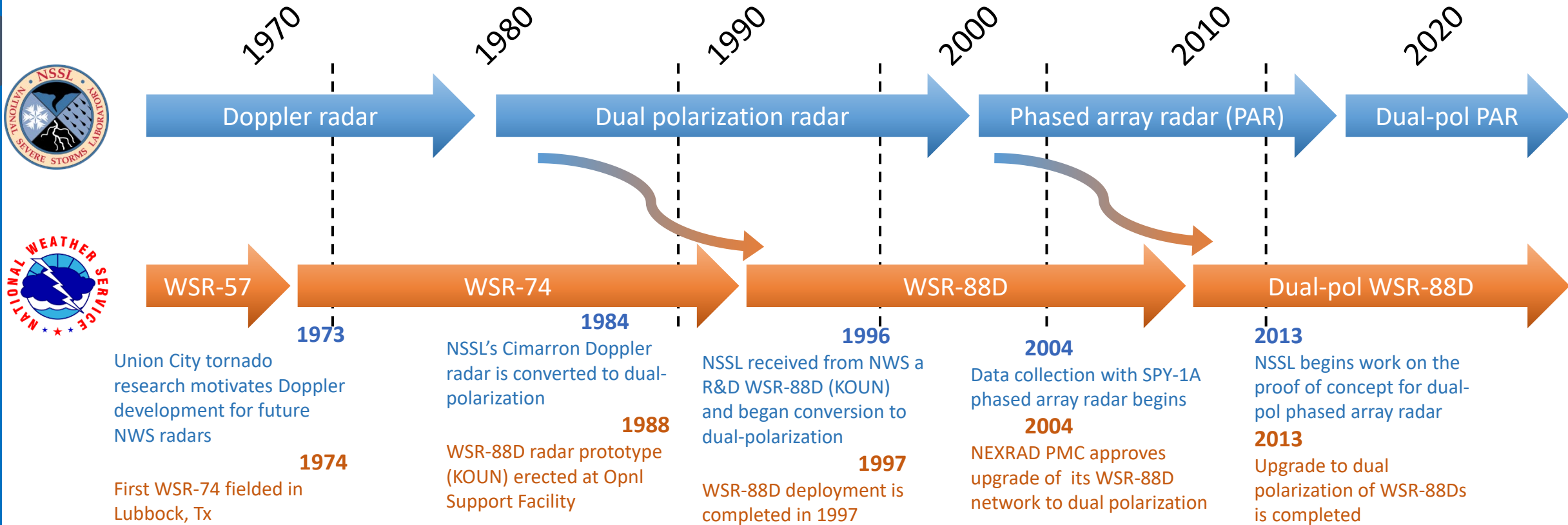
- Weather Radar
- NOAA Hazardous Weather Testbed (HWT)
- VORTEX-SouthEast



# Performance: Weather Radar



- NSSL has been the primary national resource for development of weather radar technologies since the lab's inception
- NWS implementation of these technologies lags development by 10-15 years
- The technologies developed by NSSL are fundamental components of national infrastructure

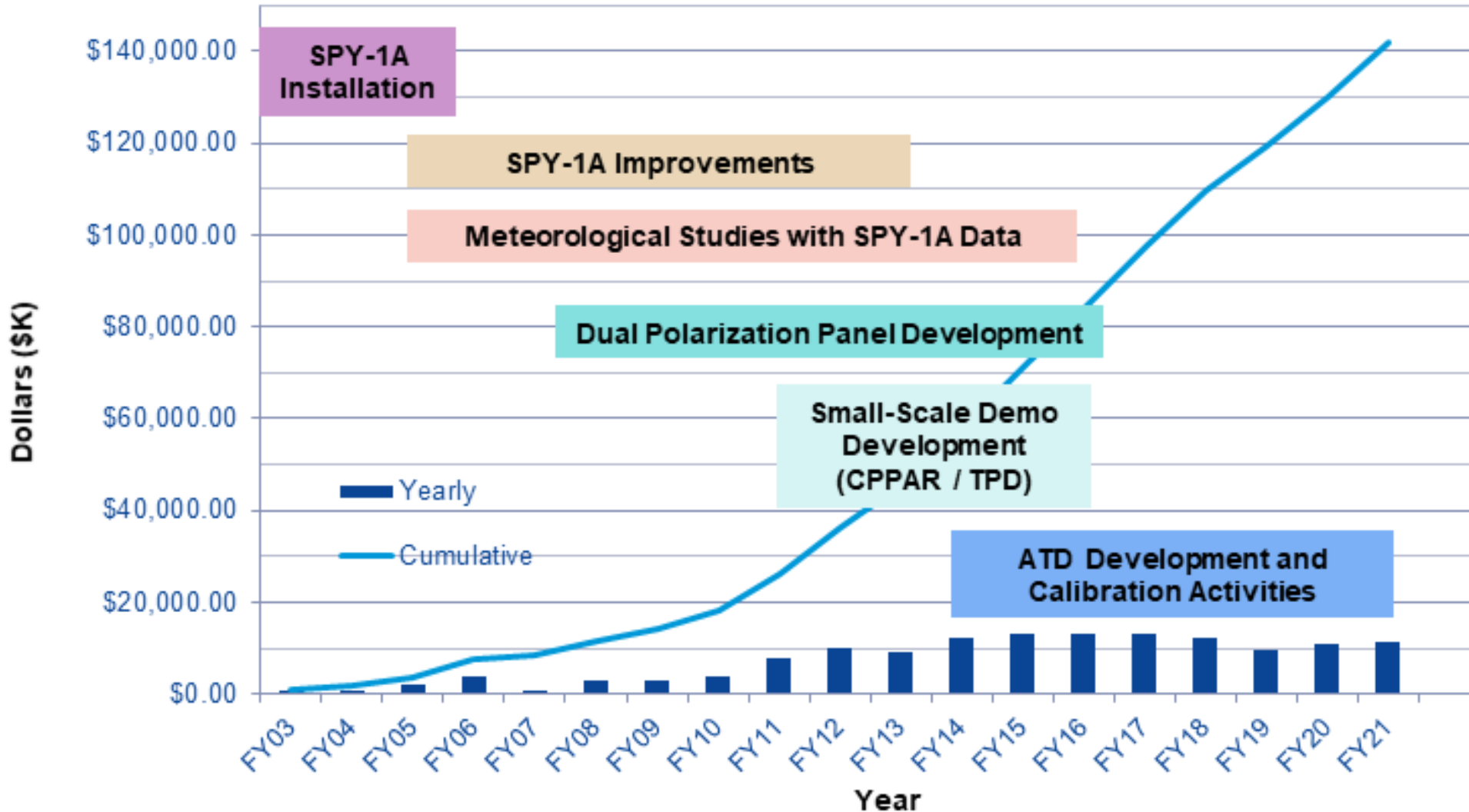






# PAR R&D Funding History

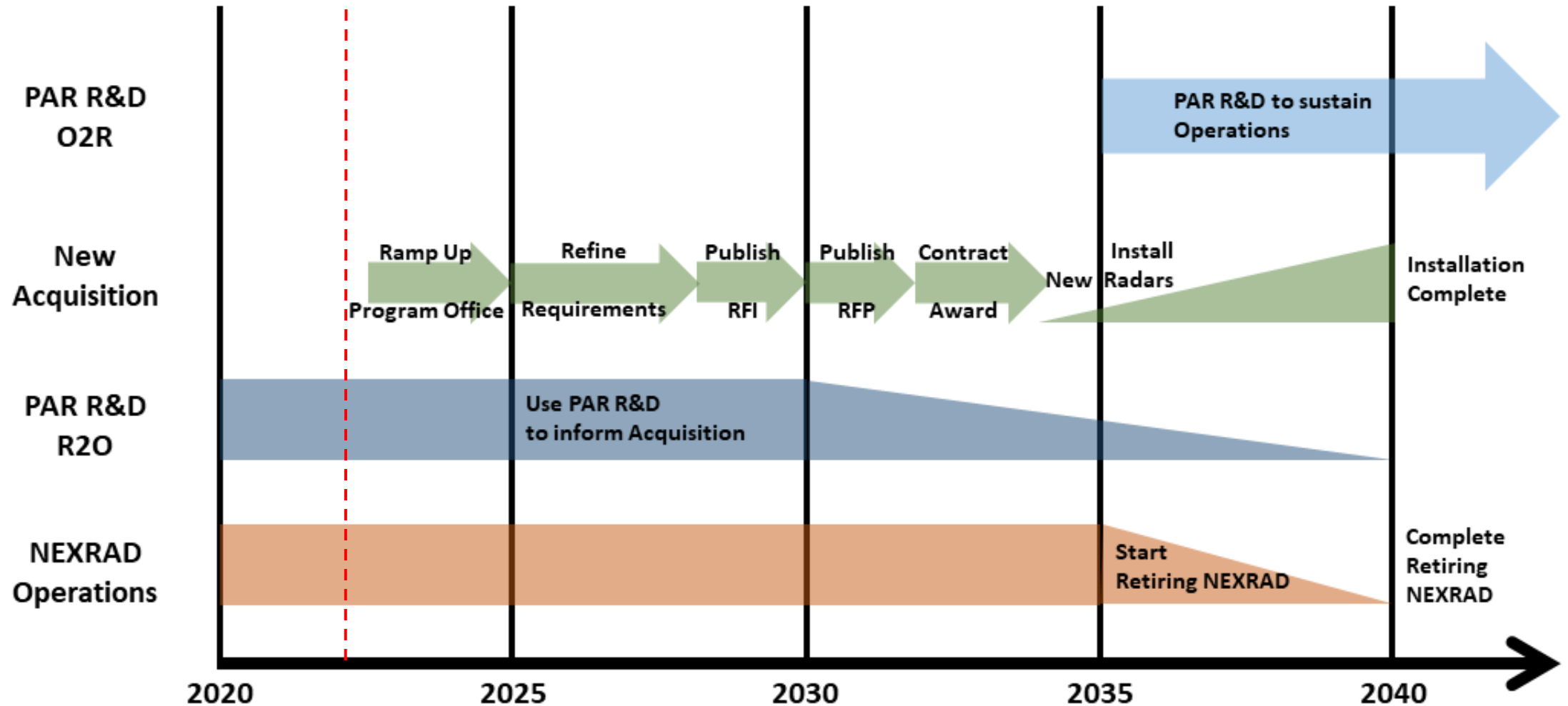
❖ Does not include initial investment of \$24M by non-NOAA entities to establish SPY-1A system in Norman



# SCHEDULE – PAR R&D Program (FY20 and beyond)



Adapted From the *Weather Radar Follow-On Plan* Report to Congress delivered 15 June 2020





# Performance: NOAA Hazardous Weather Testbed

- Started as the “Spring Program” in 2000, driven by mutual interests of NSSL Researchers and Storm Prediction Center (SPC) Forecasters

SPC Operations



NSSL Researchers

SPC Forecasters

Norman Weather Forecast Office (WFO) Meteorologist in Charge





# Performance: NOAA Hazardous Weather Testbed

- By 2003, we were attracting a broad range of scientists and forecasters



Detroit WFO  
Forecaster

NSSL Scientist

UK Met Office  
Forecaster/Scientist

NWS  
Headquarters

Environment Canada  
Scientist

Naval Research  
Laboratory Scientist



# Performance: NOAA Hazardous Weather Testbed

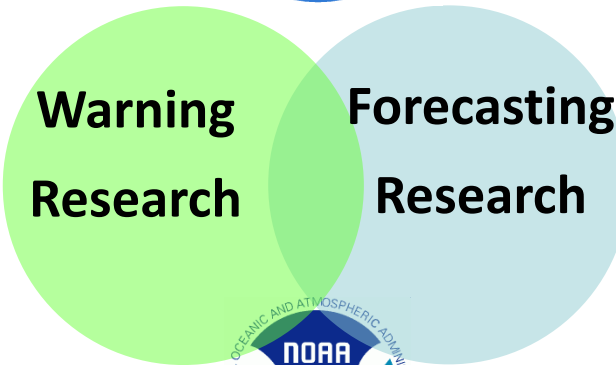
- By 2007, we were in a new building with a dedicated space and both Forecast and Warning components



NWS local forecast office  
Regional responsibility

NWS Storm Prediction Center  
Nationwide responsibility

**Local Forecasts,  
Warnings, IDSS**



**National Outlooks,  
Watches, IDSS**





# Performance: NOAA Hazardous Weather Testbed

- “The HWT is a model for all of NOAA”
  - Louis Uccellini, 2007
- Aviation Weather Testbed (AWT)
- Hydrometeorological Testbed (HMT)



- European Severe Storms Laboratory Testbed (2012)
- Australian Bureau of Meteorology HWT (2018)
- 2019 Experiments/Participants: 7/270 (all in-person)
- 2021 Experiments/Participants: 8/380 (all virtual)
- In the last 5 years we have become the de facto gatekeepers for transfer of Severe-Weather Prediction Tools into NWS Ops



# Performance: VORTEX-Southeast

- In January 2015, Congress unexpectedly appropriated \$5M money and directed NSSL to solve the Tornado problem in the Southeast

- From FY15 Omnibus Spending Bill:

*“...establish why tornadic activity in the Southeast results in more deaths per capita than any other region of the country.”*

*“...to better understand how environmental factors that are characteristic of the southeastern United States affect the formation, intensity, and storm path of tornadoes for this region”*

- **Rapid, effective, inclusive NSSL response**

- Grants Program (over 50% of funds for competitive grants)
- Community Engagement
- Field Programs



**VORTEX**  
SOUTHEAST

# Performance: VORTEX-Southeast



## Physical Science Research

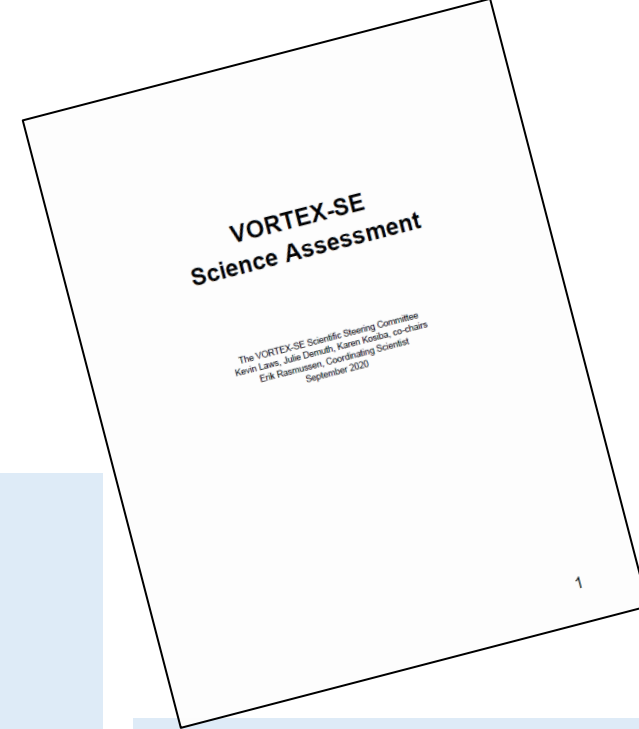
- Terrain and Roughness Influences
- Internal Storm Processes
- Storm Environment Influences
- Climatology
- Tornado Damage Assessment
- Landfalling Hurricane Tornadoes
- Prediction Models

## Social, Behavioral, and Economic Sciences (SBES)

- Forecaster Decision-Making
- Risk Communication to Public
- Risk Assessment, Decision-Making, and Actions Taken by Public
- Assessing Tornado Impacts and Vulnerabilities

## Field Campaigns

- Broad Meteorological Community Collaboration
- Procurement and Testing of New Instruments and Observation Strategies
- Impacts of New Observations on Analysis and Prediction
- Leverage other Funding Sources (e.g., NSF, NOAA)



**VORTEX**  
SOUTHEAST

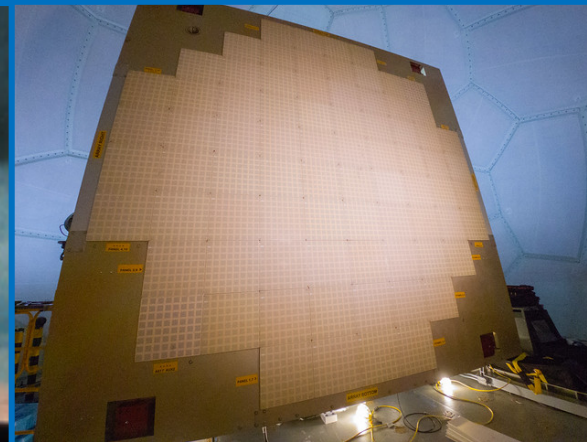




# 2021 NSSL Science Review

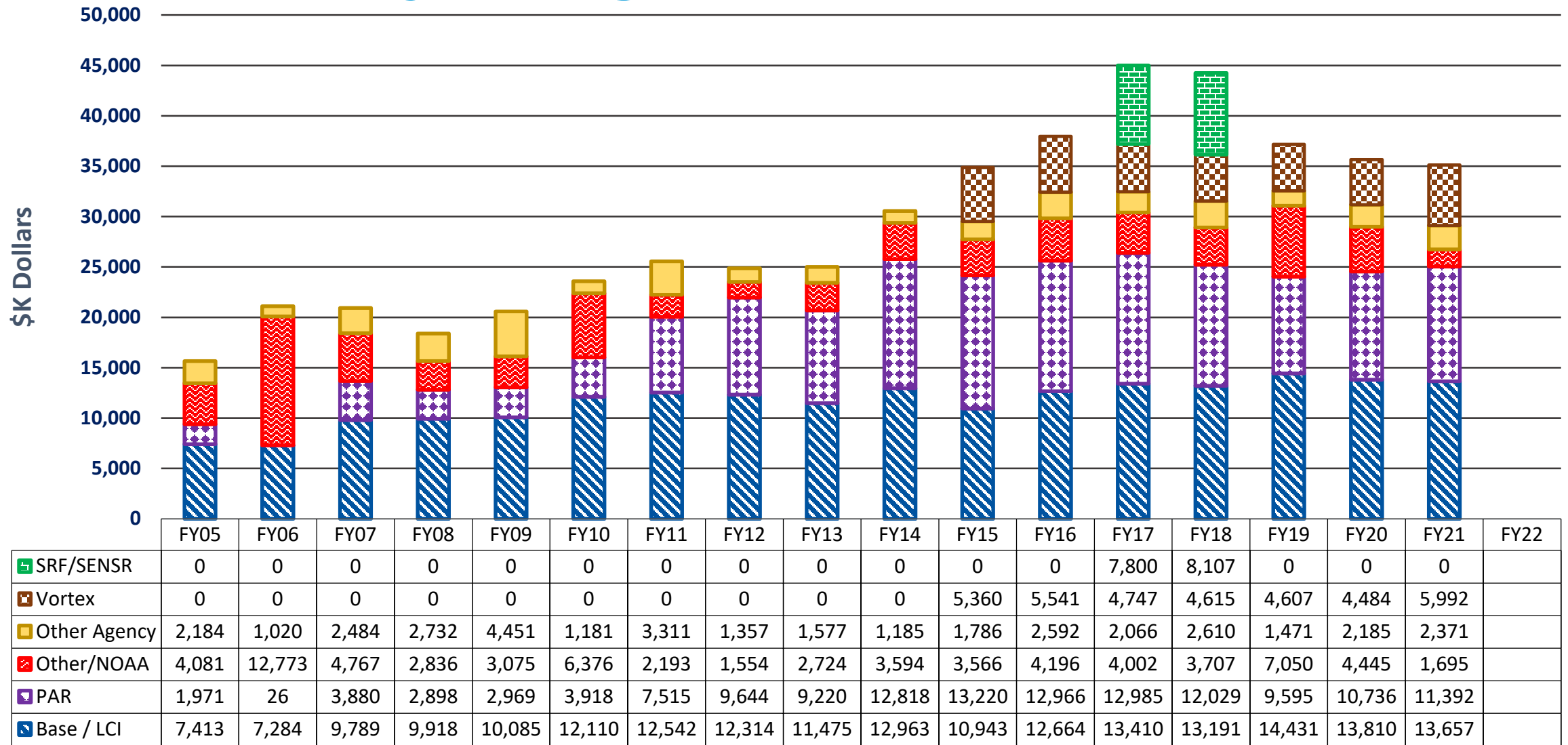
# Budget & Workforce

Kurt Hondl, Deputy Director, NSSL





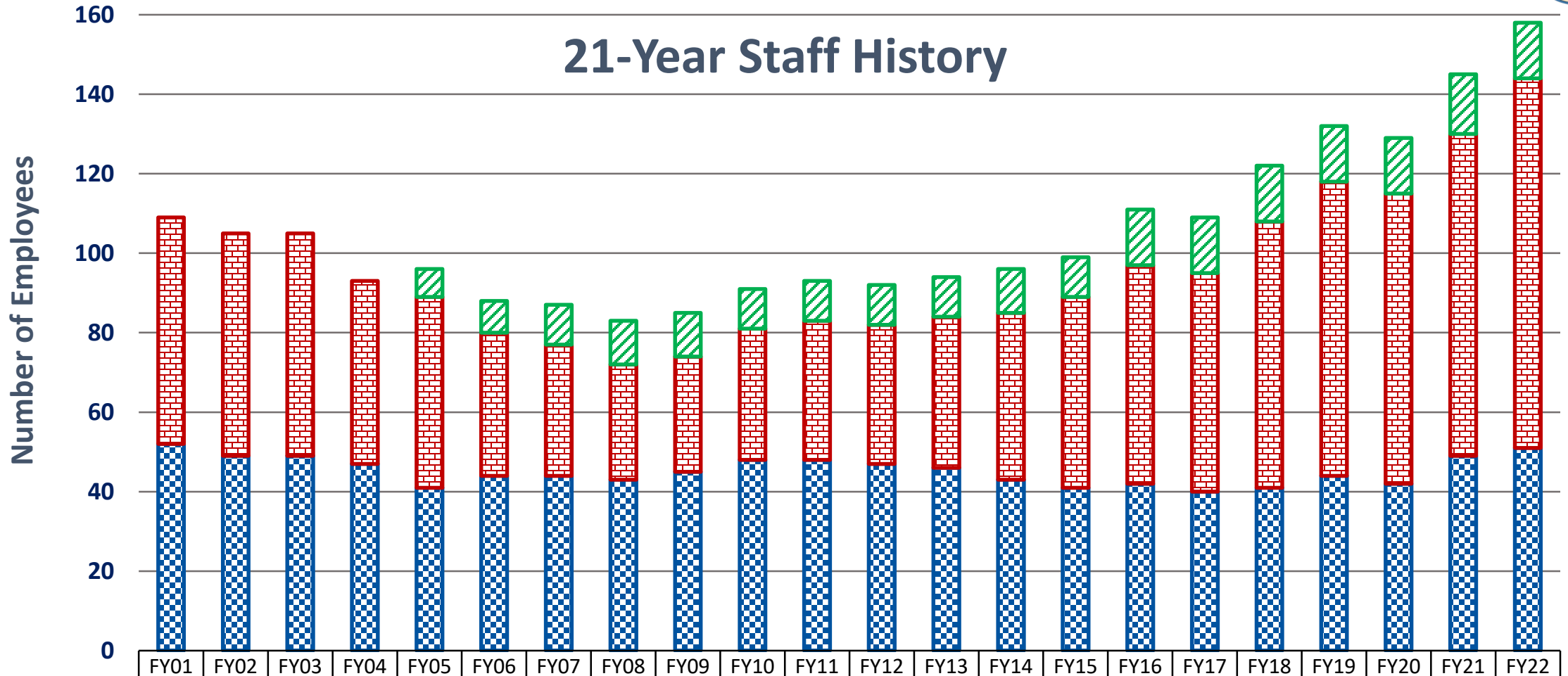
# NSSL Yearly Budget





# NSSL Workforce

## 21-Year Staff History



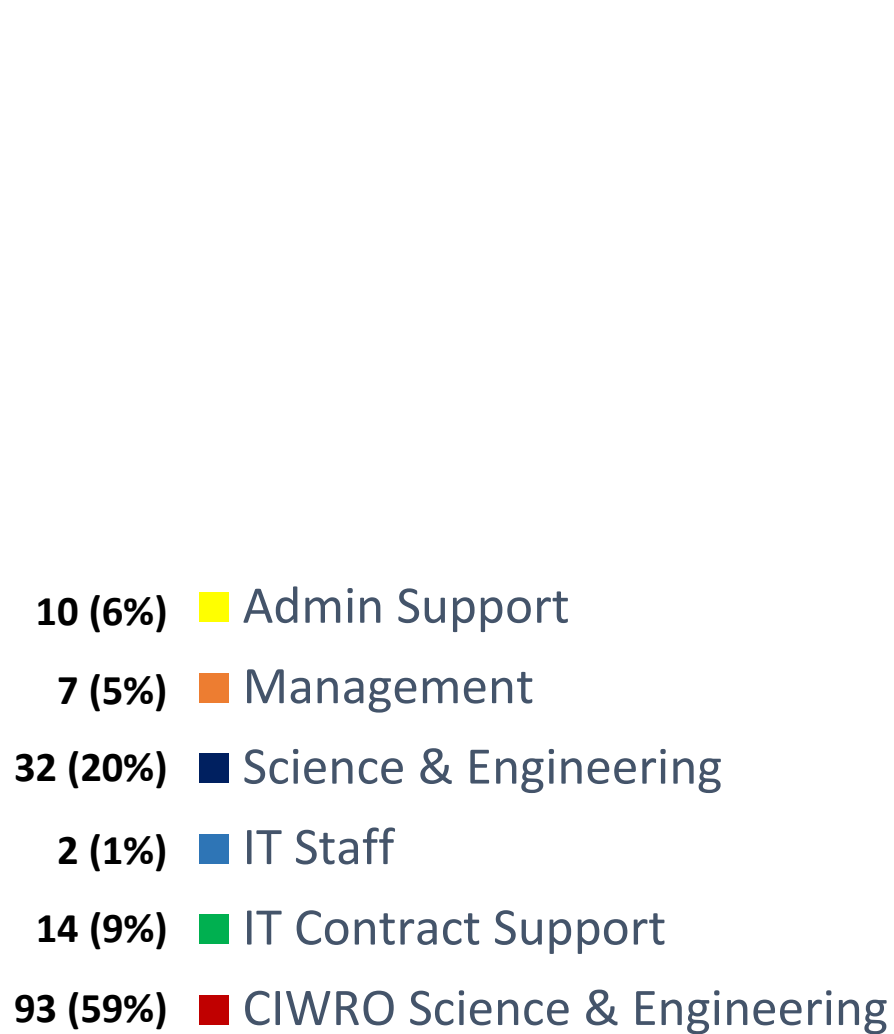
	FY01	FY02	FY03	FY04	FY05	FY06	FY07	FY08	FY09	FY10	FY11	FY12	FY13	FY14	FY15	FY16	FY17	FY18	FY19	FY20	FY21	FY22
IT Contractor					7	8	10	11	11	10	10	10	10	11	10	14	14	14	14	14	15	14
CIMMS/CIWRO	57	56	56	46	48	36	33	29	29	33	35	35	38	42	48	55	55	67	74	73	81	93
Federal	52	49	49	47	41	44	44	43	45	48	48	47	46	43	41	42	40	41	44	42	49	51





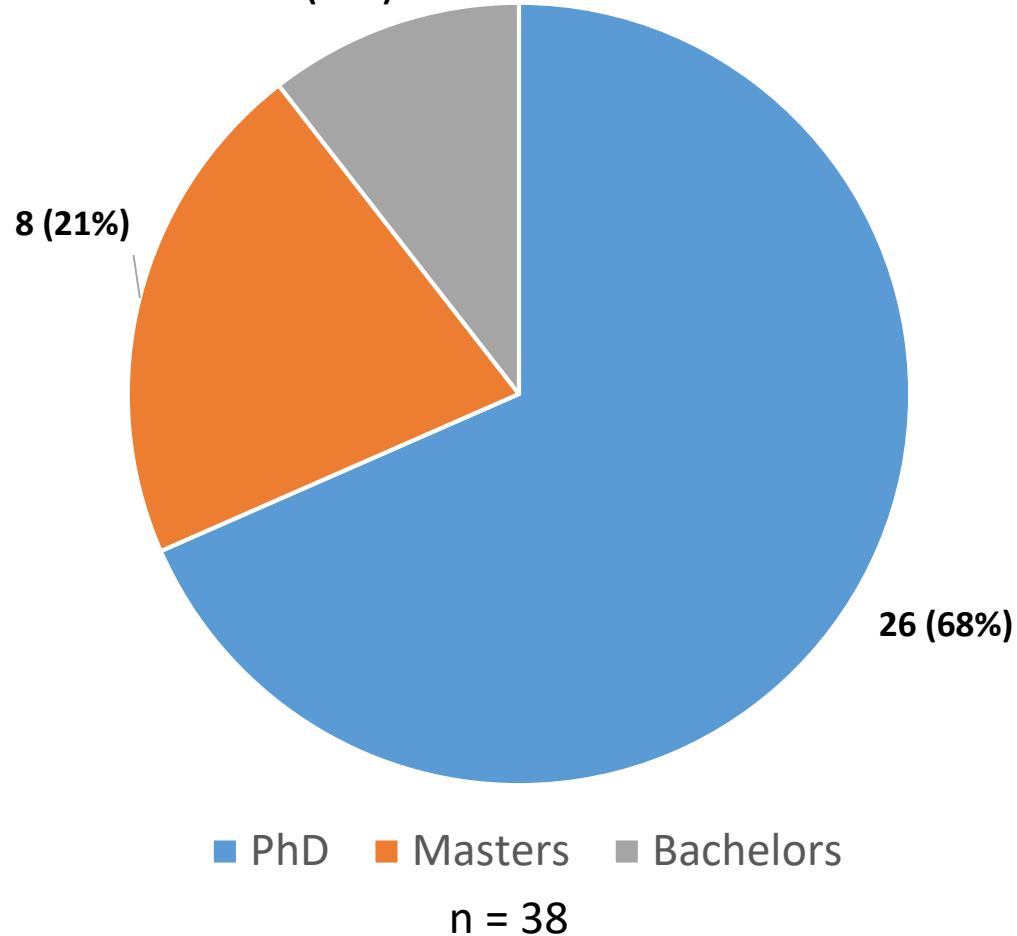
# Workforce

## Workforce Distribution

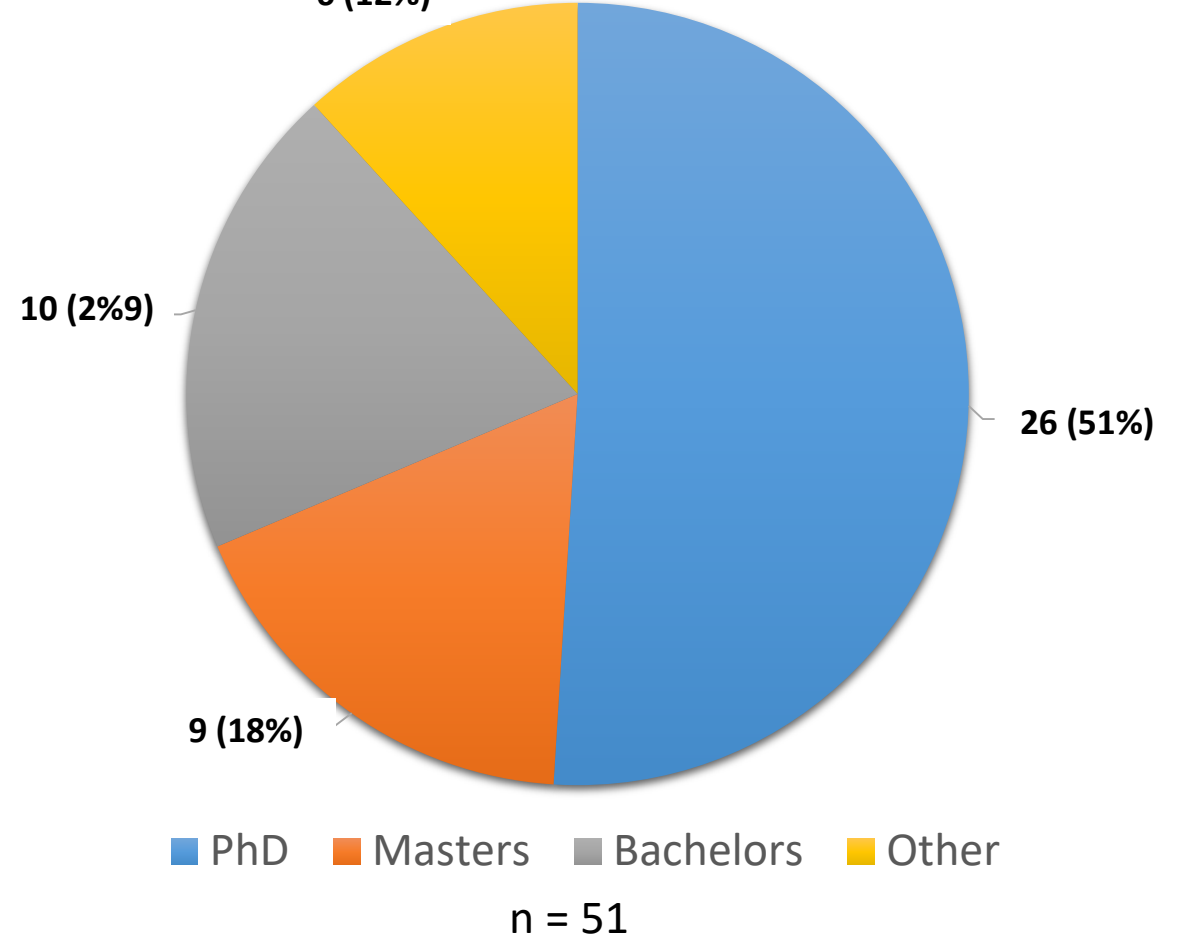


# Federal Workforce: Education

Science & Engineering Workforce  
4 (11%)



Total Federal Workforce  
6 (12%)



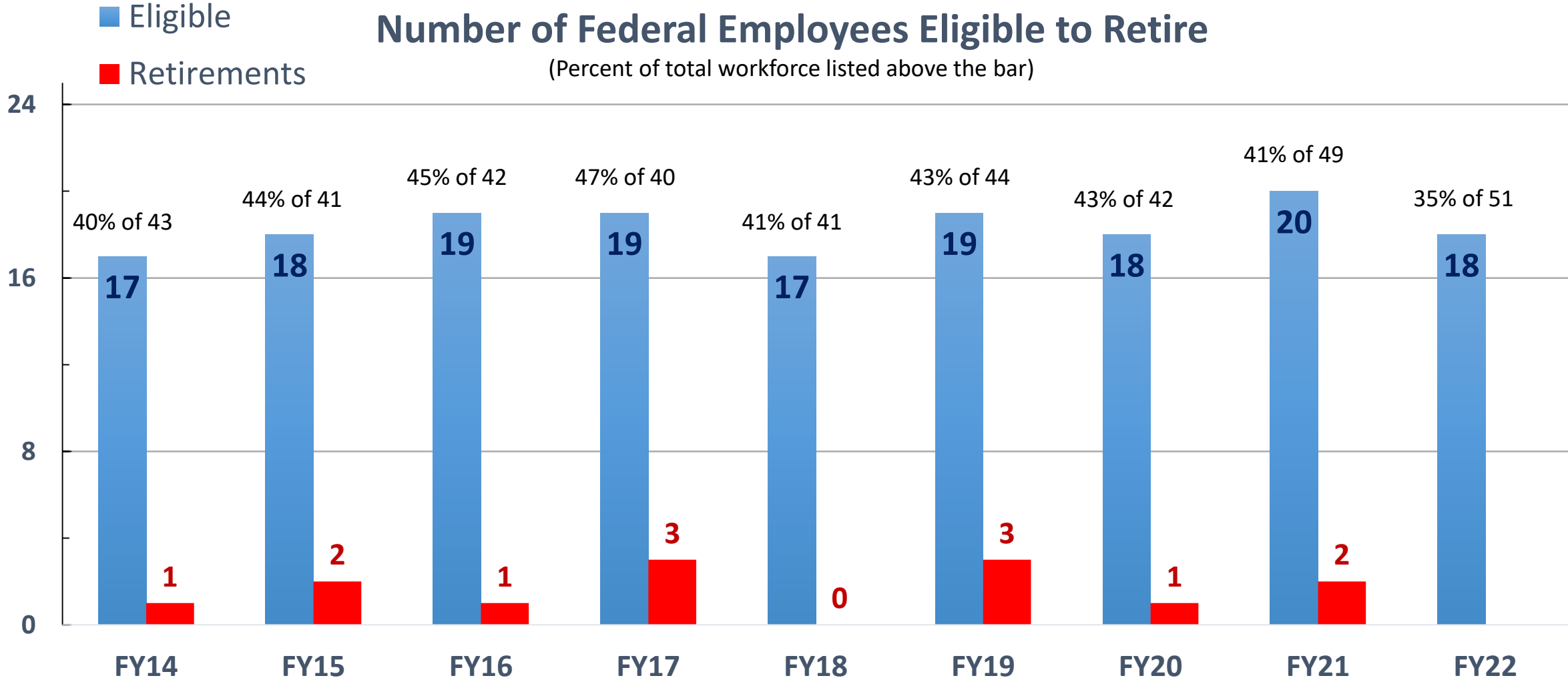
# Workforce

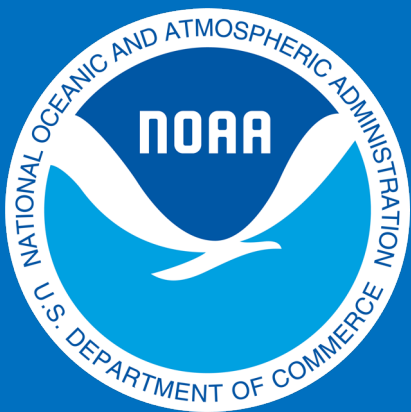
November 2021 (51 employees)  
 The current average age is 51.8  
 Average years of service is 16.8



## Number of Federal Employees Eligible to Retire

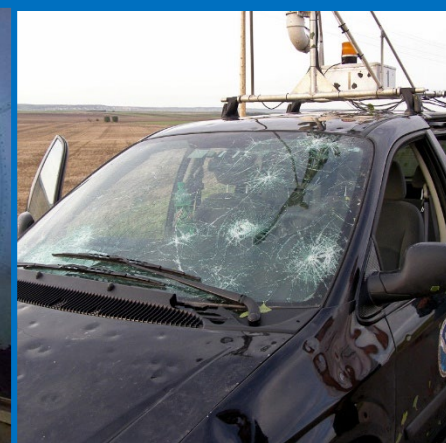
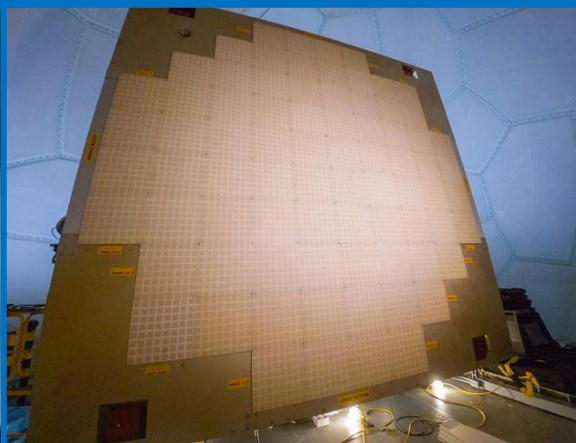
(Percent of total workforce listed above the bar)





# NSSL's Workplace Culture

Pam Heinselman, PhD; NSSL Chief, FRDD  
Lead, NSSL Diversity, Inclusion, and Sustainability Team (NDIST)



# Vibrant, Innovative Workplace Culture: Driven by Diversity & Inclusion



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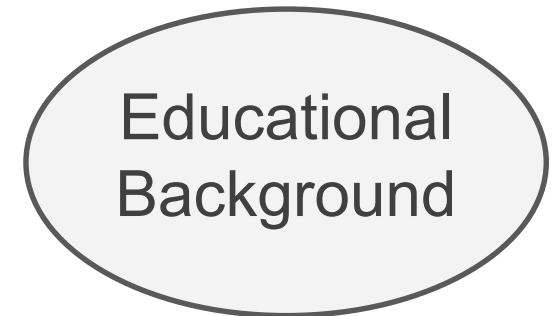
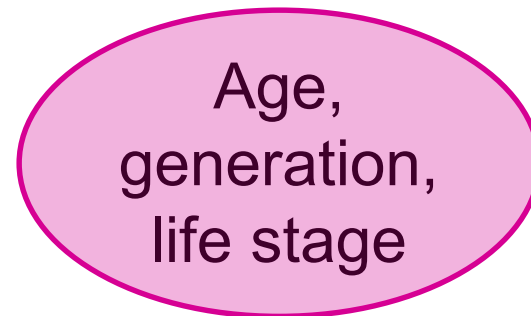
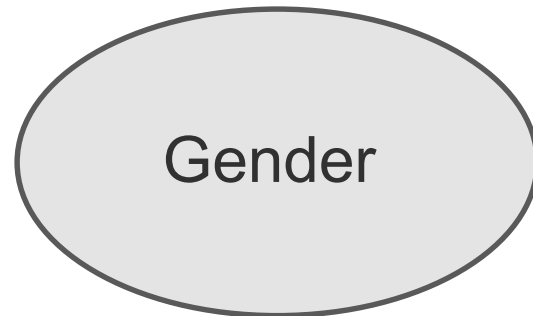
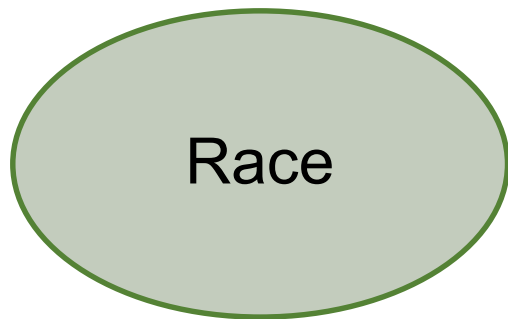




# 2015 Review Recommendation: Improve diversity of the workforce, please!

*“There is a NSSL-wide lack of diversity among the federal workforce with respect to race, gender, age and educational background. Women and minorities are markedly absent from lab leadership or management positions.”*

*Emphasis added*



# Diversity and Inclusion: Key to our Success



**Diversity & Inclusion Plan**  
 Submitted by Lans P. Rothfus  
 September 2017  
 (Derived from OAR EEO/Diversity Program material)

## Definition of Diversity

Workforce Diversity is defined as a collection of individual attributes that together help agencies pursue organizational objectives efficiently and effectively. These include, but are not limited to, characteristics such as national origin, language, race, color, disability, ethnicity, gender, religion, sexual orientation, gender identity, socioeconomic status, veteran status, and family structures. The concept also encompasses differences among people concerning where they grew up and where they have lived and their differences of thought and life experiences (OAR 2011)

## Definition of Inclusion

We define inclusion as a culture that connects each employee to the organization; encourages collaborations, flexibility, and fairness; and leverages diversity through the organization so that all individuals are able to participate and contribute to their full potential.

## Mission

With concerted efforts and the collaboration of OAR Leadership, EEO/Diversity Staff, EEO/Diversity Advisory Committee and hiring officials, increase the diversity of NSSL workforce. This will be carried out through three goals: **Workforce Diversity, Workforce Inclusion and Sustainability**. These goals are in alignment with the goals as set out in the Government-Wide Diversity & Inclusion Strategic Plan and the proposed NOAA Diversity Inclusion Strategic Plan. The goals will be discussed in detail later in this NSSL Diversity Inclusion Plan.

## Why Diversity and Inclusion are Important

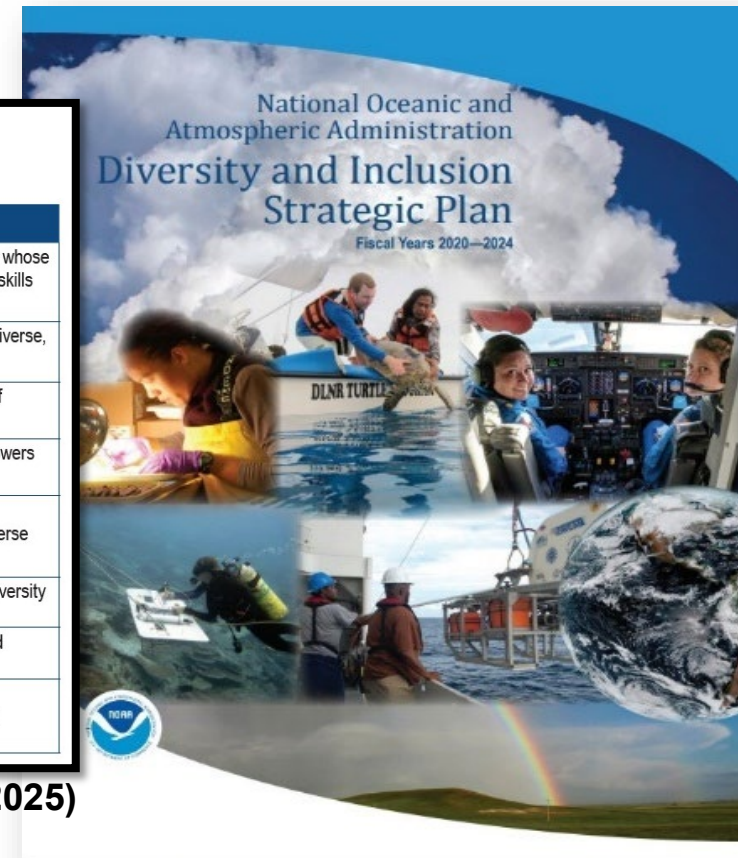
Decades of research by organizational scientists, psychologists, sociologists, economists and demographers show organizations with a diversity of race, ethnicity, gender and sexual orientation are more innovative than homogeneous groups (Phillips 2014). For example, an international study of public companies (McKinsey & Company 2015) showed those with high diversity and gender diversity were 35% and 15%, respectively, more likely to outperform the industry median. David Dye, Director of Human Capital at Deloitte, said, "The U.S. population's demographics is shifting and it is important that federal agencies have their workforce align with the customer base. We also know diversity and inclusion inspire great innovative thought that comes from different perspectives. For those reasons, diversity and inclusion is a terribly important topic for the federal government."

## To Whom the Plan Applies

This is a plan for the Federal employees of NSSL. Because of the close working relationship between employees of NSSL and the Cooperative Institute for Mesoscale Meteorological Studies (CIMMS), however, the actions and activities described herein will be made available to

## Summary of Goals and Objectives

GOALS	OBJECTIVES
1. <b>WORKFORCE DIVERSITY:</b> Recruit and attract a diverse, highly-capable workforce	1. Effectively recruit qualified individuals at all levels whose diverse backgrounds, experience, education and skills will advance NOAA's mission. 2. Reduce barriers and biases in NOAA's hiring of diverse, highly-qualified candidates 3. Create a culture that promotes the employment of individuals with disabilities.
2. <b>WORKPLACE INCLUSION:</b> Build a Work Environment That Promotes Inclusion	1. Cultivate an inclusive work environment that empowers and engages every NOAA team member. 2. Ensure all staff have equal access to career development opportunities in order to retain a diverse and qualified workforce.
3. <b>SUSTAINABILITY:</b> Build Sustained and Adaptive Leadership Commitment to a Diverse and Inclusive NOAA Through Accountability, Data and Education.	1. Expand leadership accountability for managing diversity and inclusion across NOAA. 2. Increase the visibility of leaders in diversity-related activities. 3. Eradicate racial inequalities and all forms of discrimination and harassment, especially sexual assault and sexual harassment (SASH).



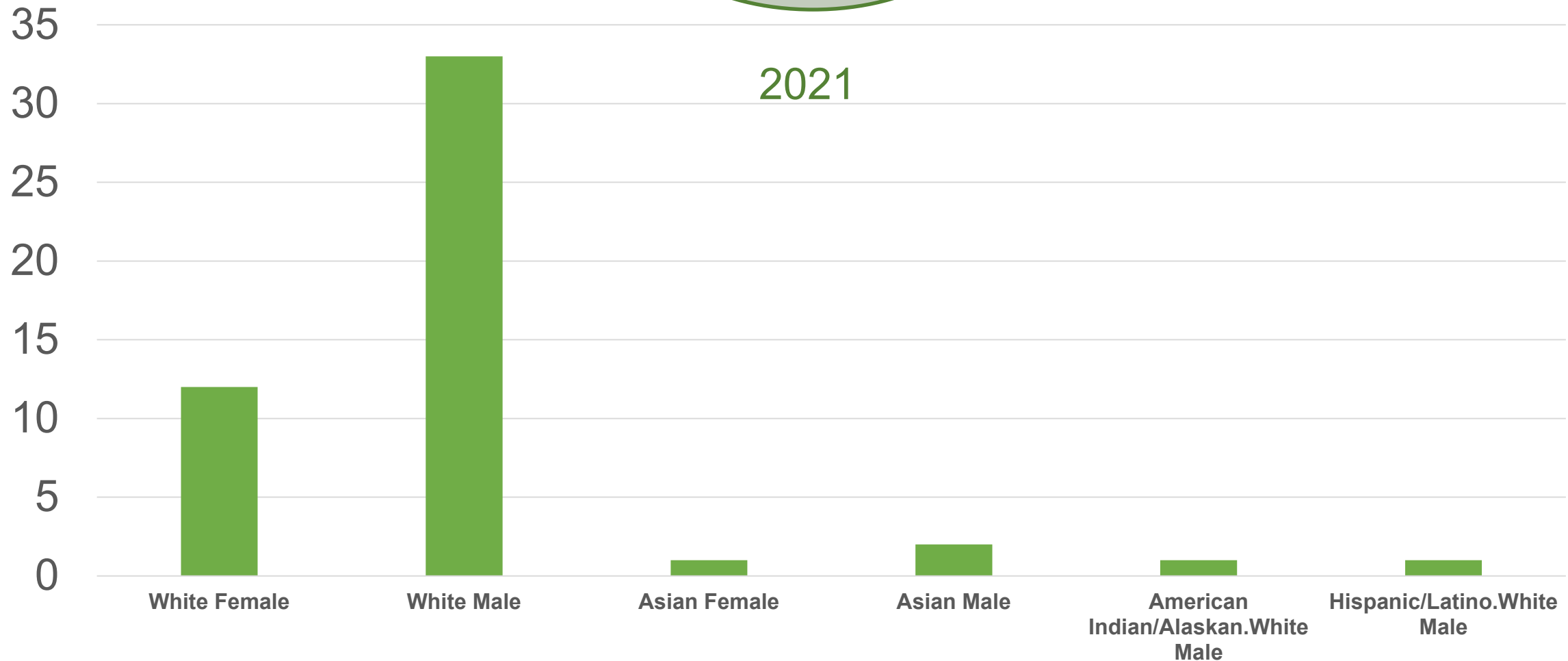
## NOAA D&I Strategic Plan (2020-2025)



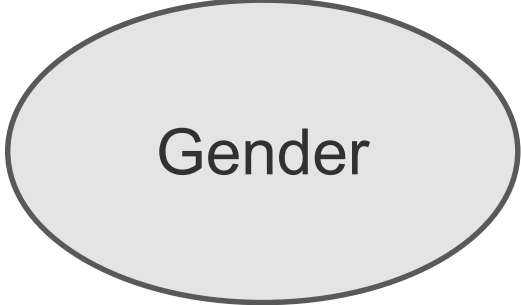


# Federal Diversity:

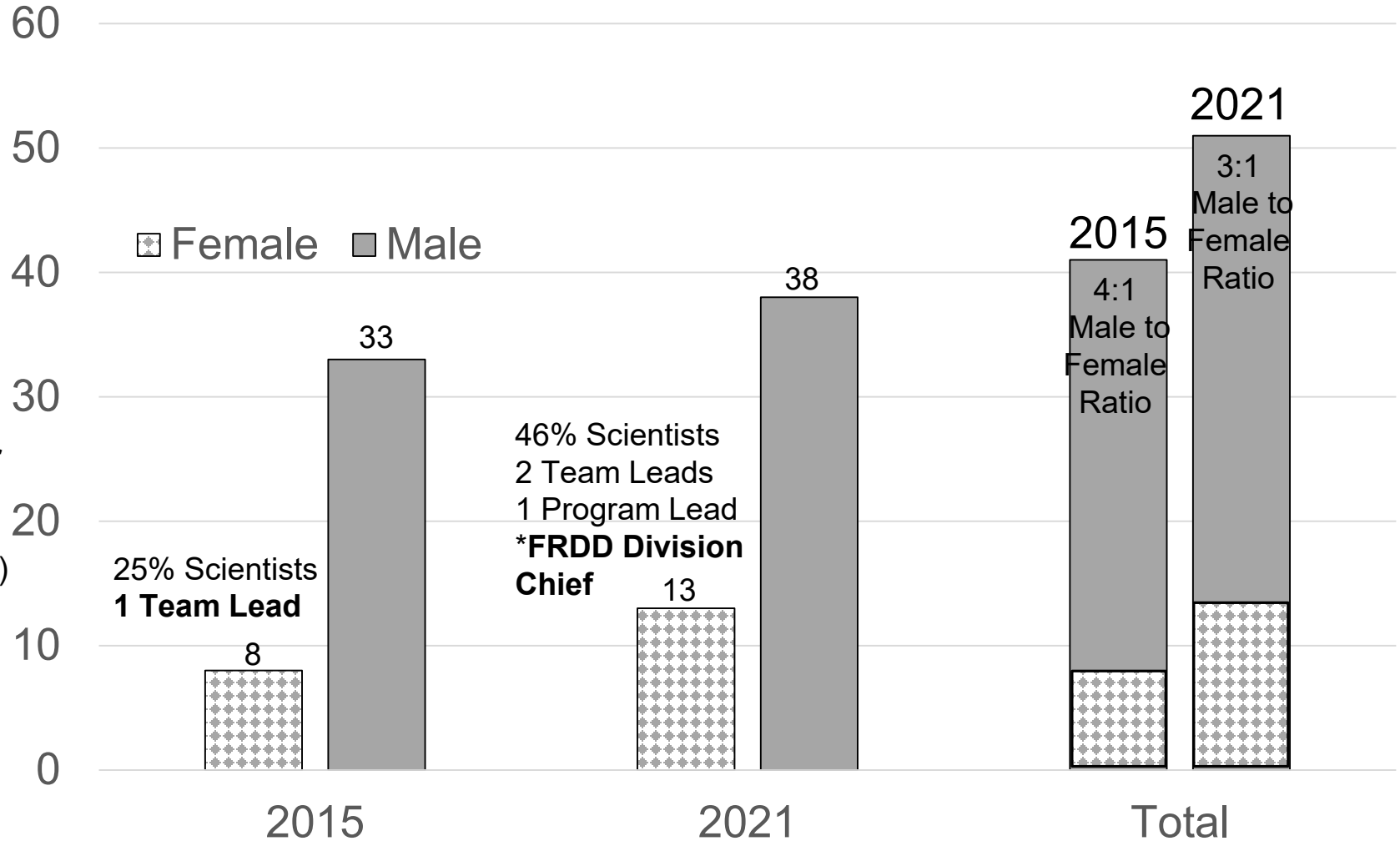
Race



# Federal Diversity:



**Increased # billets**  
 Opportunity increase  
 diversity of **expertise**, race,  
**gender**, age, etc.



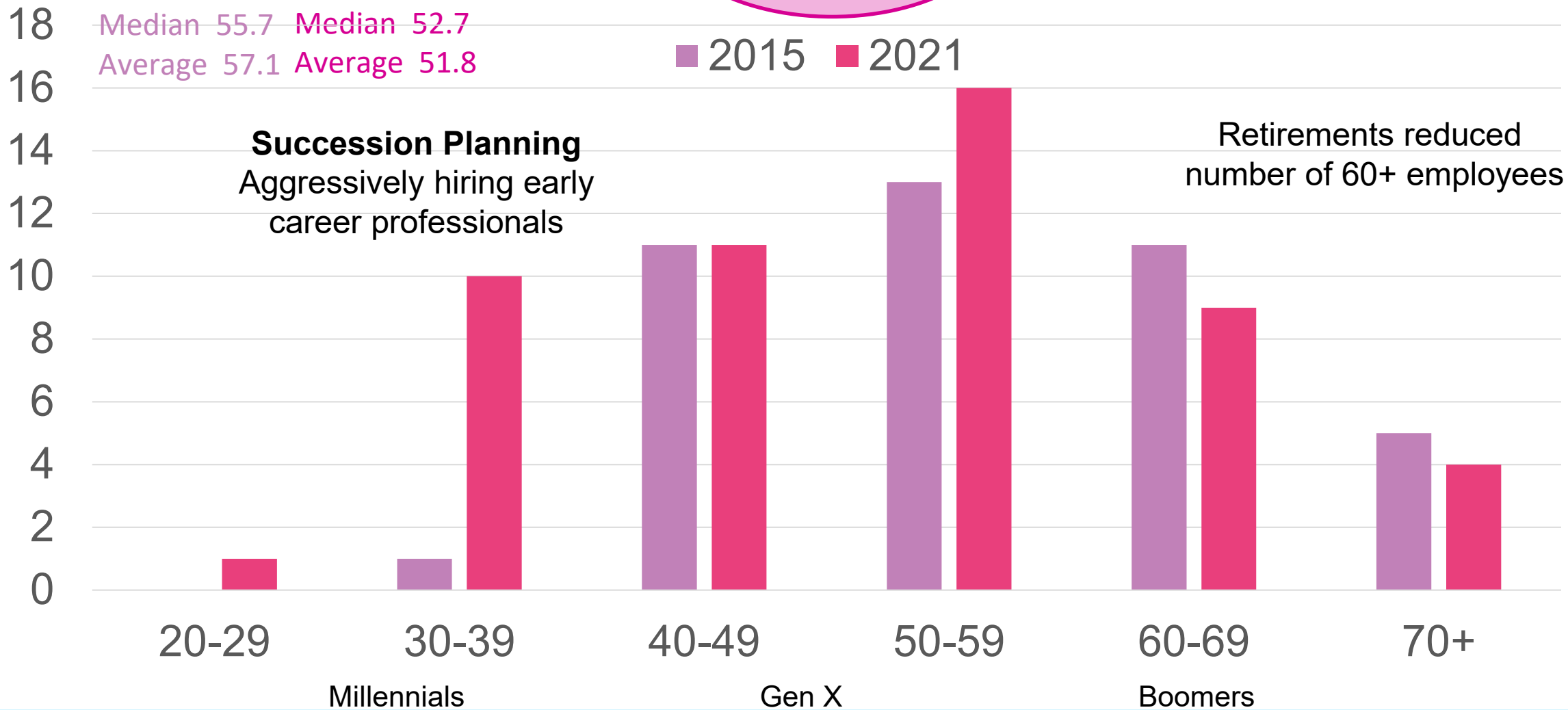
**\* # female scientists before & after hire of FRDD Division Chief**  
 2015: 2 female scientists (2 CI)  
 2021: 6 female scientists (2 fed, 4 CI)





# Federal Diversity:

Age, generation, life stage

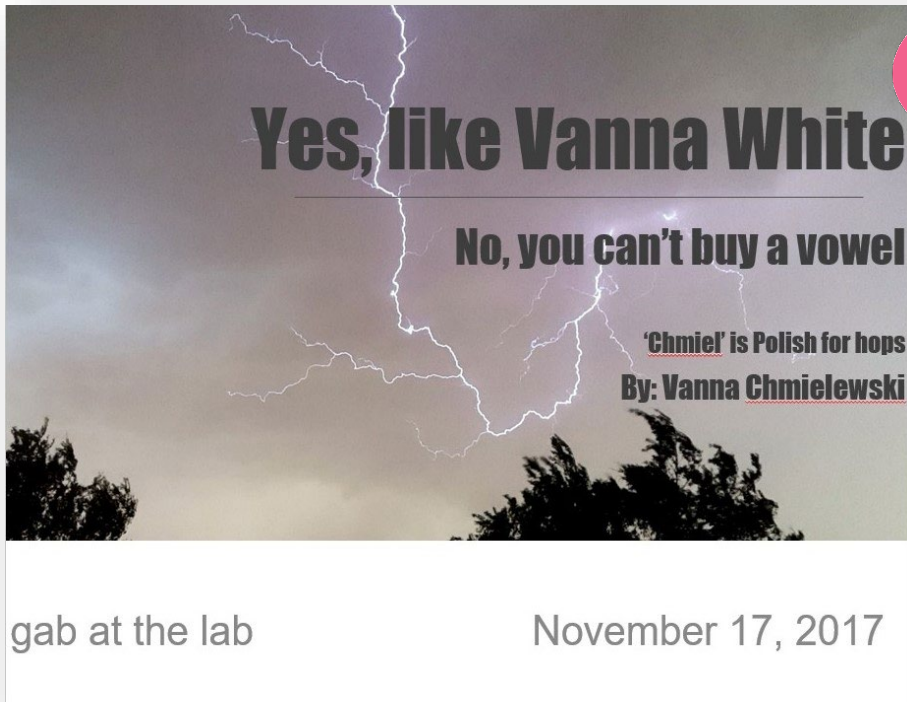


# Goal: Vibrant, innovative culture driven by a diverse & inclusive workforce



## “Gab at the Lab” 2015-Present

131 “Getting to Know You”  
Presentations



Quarterly “Celebrations” recognize accomplishments & build relationships





## NSSL Diversity, Inclusion, and Sustainability Team 16 October 2017 to Present

NDIST Lead Deputy Director

One representative from each NSSL's four divisions

Outreach Committee (CIWRO & NSSL)



NSSL Rep: OAR D&I  
Advisory Committee

NSSL Rep: OAR's  
EEO/Diversity Committee

Purpose: Work together to foster **diversity** and **inclusion** in NSSL, monitor results of diversity and inclusion efforts, and collaborate directly with NSSL management along the way



## NSSL Diversity, Inclusion, and Sustainability Team 16 October 2017 to Present

NDIST Lead Deputy Director

One representative from each NSSL's four divisions

Outreach Committee (CIWRO & NSSL)



NSSL Rep: OAR D&I  
Advisory Committee

NSSL Rep: OAR's  
EEO/Diversity Committee

### Awards

- ✓ NOAA Research EEO/Diversity Laboratory of the Year
- ✓ OAR EEO/Diversity Award for Exemplary Service 😊
- ✓ Society of American Indian Government Employees (SAIGE) Leadership Award 😊



# NSSL Diversity, Inclusion, and Sustainability Team: Listening to, Learning from, and Supporting Each Other



## Implemented

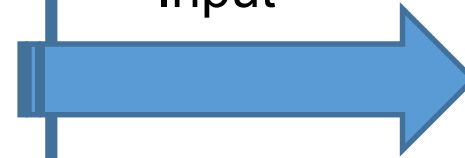
Quarterly NDIST Meetings Open to all NSSL employees & Affiliates



## **Affinity Groups**

Gamers  
Book Clubbers  
Teleworking Parents

Employee Input



Outreach Committee (CIWRO & NSSL)



**30+ Employee Surveys since April 2020**

How are you feeling today?

What if anything is impeding your productivity?

What can we do to help?

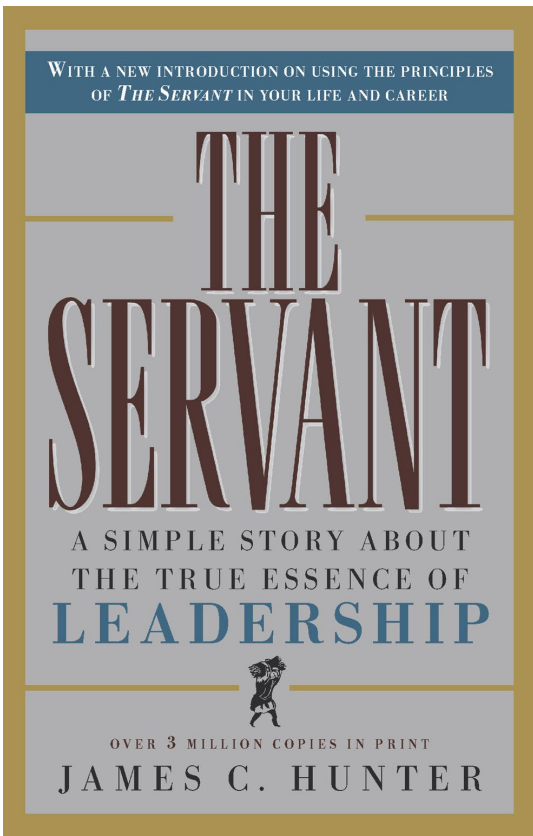
What would you like to see NSSL do to develop a more diverse and inclusive workforce and environment?



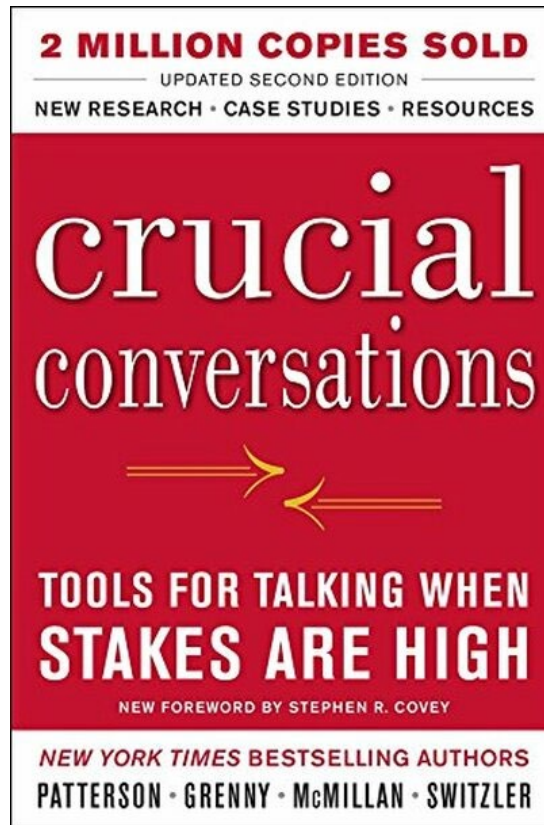
# NSSL Diversity, Inclusion, and Sustainability Team: Learning Together to Evolve our Culture



~45 attended 3 internal sessions



Taken by Team Leads &  
NSSL Management (2018)



2021 EMOTIONAL INTELLIGENCE SERIES

**What is Emotional Intelligence?  
Is it important in leadership?**

Emotional Intelligence Series -- Session 1

Developed by Pam Heinselman & Alan Gerard  
Open Forum March 5, 2021

**What triggers you?**



# NSSL Diversity, Inclusion, and Sustainability Team: Conducting Outreach to attract diverse pool of next-generation scientists



American Indian Science & Engineering Society National Conference



2019 National Weather Festival



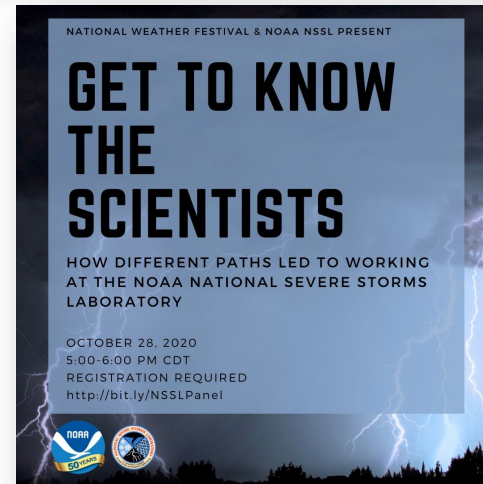
Targeted Observation by Radars and UAS of Supercells (TORUS) Open House



Pre-COVID

2020 & 2021 National Weather Festivals

Post-COVID



# Participating in programs like NOAA Cooperative Science Center in Atmospheric Sciences & Meteorology (NCAS-M) to build a more diverse early-career hiring pool



Arianna Jordan



- Cohort 1 & Cohort 3, Alumni
- San Jose State University (B.S. Meteorology) & Howard University M.S. in Atmospheric Sciences



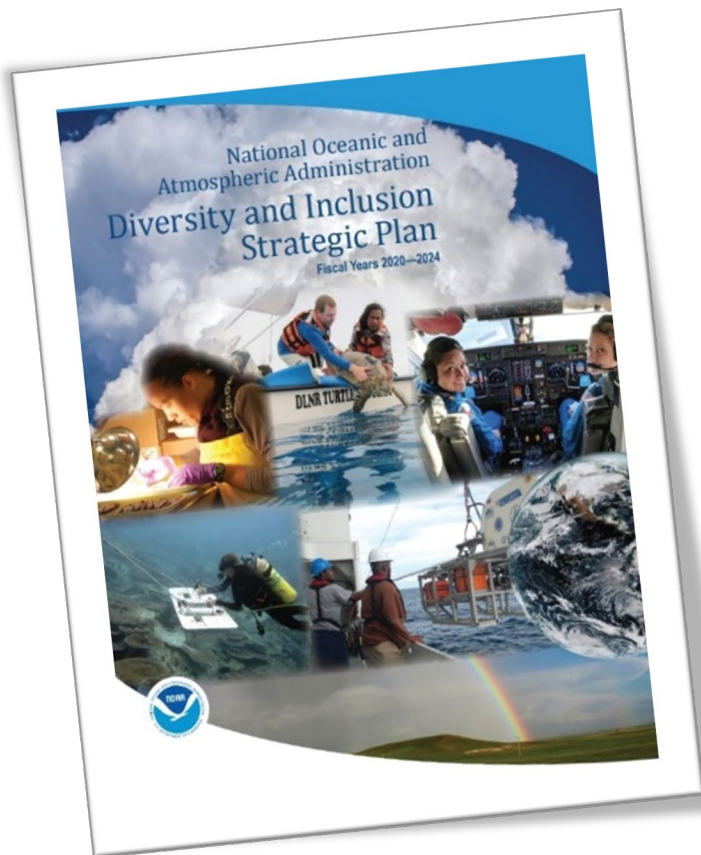
M.S. Co-Advisors Drs. Adam Clark (NSSL) & Kim Hoogewind (CIWRO)

Now: PhD Student at OU School of Meteorology



Conducting fieldwork with NSSL PhD Advisor Dr. Elizabeth Smith and other boundary layer science & instrumentation experts.





Next 5-10 years: Work with NOAA, OAR, & other partners to build & implement organizational strategies & practices that advance a shared vision

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