Status and Future Path of Evolving the NWS

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NOAA Assistant Administrator for Weather Services
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Seattle, WA
Outline

• Transition
• NWS HQ Organization
• Budget
• Portfolio Highlights
• Weather-Ready Nation
• NWS Evolve
• Impact-based Decision Support Services
Transition
FY 2017 Full Year Budget Target based on FY 2016 Enacted Level Composition by Portfolio

<table>
<thead>
<tr>
<th>PPA</th>
<th>Funds* (in thousands of dollars)</th>
<th>Full Time Employees (FTE)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Observations ORF</td>
<td>216,363</td>
<td>804</td>
</tr>
<tr>
<td>Observations PAC</td>
<td>16,720</td>
<td>-</td>
</tr>
<tr>
<td>Central Processing ORF</td>
<td>92,871</td>
<td>232</td>
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<tr>
<td>Central Processing PAC</td>
<td>64,261</td>
<td>22</td>
</tr>
<tr>
<td>Analyze, Forecast and Support ORF</td>
<td>496,031</td>
<td>3,010</td>
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<tr>
<td>Dissemination ORF</td>
<td>44,743</td>
<td>82</td>
</tr>
<tr>
<td>Dissemination PAC</td>
<td>45,684</td>
<td>-</td>
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<tr>
<td>Science and Technology Integration ORF</td>
<td>138,826</td>
<td>488</td>
</tr>
<tr>
<td>Facilities PAC</td>
<td>8,650</td>
<td>-</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td><strong>1,124,149</strong></td>
<td><strong>4,638</strong></td>
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</tbody>
</table>

*In thousands of dollars
FY 2017 Portfolio Highlights

**Observations**
- NEXRAD Service Life Extension
- ASOS SLEP
- Radiosonde frequency migration (auto-launchers)
- Achieve IOC for GOES-R
- Weather Buoy Recapitalization

**Science & Tech Integration**
- Complete GOES-R training development (SIFT)
- National Water Model v 1.1
- GDAS/GFS upgrade (last spectral upgrade)
- NGGPS Dynamic Core Integration
- HWRF upgrade
- Implement Impacts Catalog IDSS Portal
- National Blend of Models v3.0

**Facilities**
- Complete relocation of WFO Davenport & WFO Boston
- Initiate Facility Assessments for 3rd 1/3
- Complete Phase 1 disposal of Annette Island, Alaska

**Dissemination**
- Shutdown legacy NWSTG
- OneNWS upgrades for 50 CONUS sites
- Mass Dissemination for hazardous weather
- GOES-R Readiness

**Central Processing**
- AWIPS configured for GOER-R data
- Complete use case development for NAWIPS
- Extend the performance period WCOSS supercomputing systems and service.

**WRN Ambassador Initiative**
- 4100+ Ambassadors

**Analyze, Forecast, Support**
- Integration of GOES-16 products into SWPC operations & website
- CONOPS for NWC Operations Center
- Probabilistic snowfall experiment expanded to 44 WFOs
- Add WFOs to DOT Pathfinder Project
Integrated Dissemination Program (IDP)
Long-Term Sustainable Solution

Future Functionality at IDP College Park and Boulder (Expected By March 2017)
- NWS Chat
- AOMC/EM7
- SPOT

Functionality in place at IDP College Park and Boulder* (as of December 2016)
- NOMADS*
- FTPPRD*
- TGFTP*
- MADIS*
- MRMS*
- MAG*
- Radar Level 3*
- NWSTG Switch*
- BUFR Migration Tool (BMT)*
- NLETS*
- Radar Level 2*
- EDIS/FTPMail*
- HazCollect (Extended)*
- HazCollect (Legacy)*
- FNMOC
- FTPPush*
- Global Information Center System (GISC) *
- IRIS/iNWS*
- GMDSS*
- SNOTEL*
- Hydrometeorological Automated Data System (HADS)*
- HF-FAX
- SOCKET/CMHP
- NWS GIS Services
- NOS Chart Tile
- nowCOAST
- Weather.gov
- VLAB
- SPOT

* Application operational in both College Park & Boulder

“OneNWS” Network
The future OneNWS network will consolidate all operational networks (OPSnet, Regional, etc.) as a single managed network under NCEP Central Operations (NCO).
MADIS
Meteorological Assimilation Data Ingest System

- An operational system with **100% backup capability** on NWS-managed IDP systems in College Park, MD and Boulder, CO providing a comprehensive, accurate, timely, and high density observational infrastructure for use by the weather enterprise

- Provides access to real-time and archived quality controlled datasets

- Provides a conduit to operations
  - Clarus
  - Aircraft Based Observation ESRI interactive graphical display.
  - Advanced Vertical Atmospheric Profiling Sensing (AVAPS) data.
  - Hydrometeorological Automated Data System / Automated Flood Warning System (AFWS).
  - Snow Telemetry (SNOTEL)

http://www.madis.ncep.noaa.gov
https://madis-data.ncep.noaa.gov/MadisSurface/
NGGPS Status and Future Plans

- Global model dynamical core selected (GFDL FV3) and Phase 3 integration is underway
  - Unified model strategic planning is underway
- Teams continue to identify, prioritize and develop model component and system improvements for NGGPS. Related plans include:
  - Accelerated evolution of model physics - develop/implement Common Community Physics Package (CCPP)
  - Data assimilation improvements
  - Enhanced across-team coordination
  - Accelerated model component and system development and integration of community development into testing at EMC
- Community Involvement
  - Coordinating proposal driven scientific development by universities, federal labs, and testbeds (including 2016 FFO selections);
  - Employment of GMTB
  - Collaboration with JCSDA through JEDI
STI Modeling Program Website:
http://www.weather.gov/sti/stimodeling

Information NGGPS:
http://www.weather.gov/sti/stimodeling_nggps

Information on NGGPS dycore testing is available at:
http://www.weather.gov/sti/stimodeling_nggps_implementation_atmdynamics

Information on Grants:
http://www.weather.gov/sti/stigrants
Questions?
# Implementation Plan of FV3GFS (FY17-FY19)

<table>
<thead>
<tr>
<th>FY 17</th>
<th>FY 18</th>
<th>FY 19</th>
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<tbody>
<tr>
<td>Q1</td>
<td>Q2</td>
<td>Q3</td>
</tr>
<tr>
<td>Evaluate FV3 structure and document FV3 modeling system</td>
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@ The targeted FV3GFS resolution is ~10km L128 with model top ~80 km.
& New physics: Scale-aware convection and PBL, Double-moment cloud and aerosol-aware microphysics, Unified convective and orographic gravity wave drag etc
% ~25km L128 4D-EnVAR data assimilation
Proposed Plan for FV3-based GEFS v12 (sub-seasonal ensemble system) with reanalysis and reforecast

GEFSv12 → Development testing
FY2017

FA2018

Integration testing
FY2019

Implementation testing

Help develop and test the FV3 configuration used in reanalysis and real-time DA (ESRL)

NEMS/GFS (Final GSM) Implementation

Receive FV3 GFS codes and configure it for GEFS application (EMC)

NEMS/FV3GEFS Available for reforecasts

Reanalysis production using FV3GFS (ESRL)

NEMS/FV3GEFSv12 reforecasts (EMC)

NEMS/FV3GFS in Operations

Proposed changes: 1) Start producing FV3-based reanalysis for GEFS v12 in ~Q1 FY18, using the configuration of FV3GFS. 2) Reforecasts will commence soon after starting the reanalysis, uncoupled*, with 2-tier SST approach, and will include extension to 35 days.
• Foundation for sustained growth in nationally consistent operational hydrologic forecasting capability

• Goals for NWM V1.0
  – Provide forecast streamflow guidance for underserved locations
  – Produce spatially continuous national estimates of hydrologic states (soil moisture, snow pack, etc.)
  – Implement a modeling architecture that permits rapid infusion of new data and science, and allows for geo-intelligence linkages

• Hydrologic Output
  – River channel discharge & velocity at 2.7 million river reaches
  – Surface water depth and subsurface flow (250m CONUS+ grid)

• Land Surface Output
  – 1km CONUS+ grid (soil and snow pack states; energy and water fluxes)

• Data Services
  – Public-facing NWC website
  – Data feed to River Forecast Centers
  – NOMADS data service
National Water Model (NWM)  
Future Enhancements

• **NWM Version 1.1 will be first NWM upgrade, targeted for Q3 FY17**  
  • Enhancements based upon feedback from the RFCs, broader NWS user base, internal evaluation and OWP research plans

• **NWM Version 1.1 Upgrade Highlights**  
  • Short range extended to 18 hours, medium range cycling increased to 4 X day  
  • Regional parameter calibration performed to reduce hydrologic biases  
  • Forcing improvements for NWM Analysis and Short Range forecasts  
  • Corrections and additions to stream network  
  • Improved soil infiltration and snowpack schemes  
  • Large reduction in output file size

• **Longer Term Efforts**  
  • Domain expansions to Hawaii and Alaska  
  • Coupling to coastal models (for improved total water forecast in coastal zone)  
  • Hyper-resolution modeling  
  • Drought and water quality modeling

• **NWM Version 1.2 targeted for Q1 FY18, with annual updates in Q1 every year thereafter**
**OWA Finding: Need for Local IDSS**

- NWS IDSS users are engaged and loud and clear on the need for:
  - Accuracy and consistency
  - Timely/reliable delivery

- 94% of IDSS is provided locally through the Weather Forecast Offices – No Office Closures!

- Success depends on:
  - IDSS focused on core partners and deep relationships with those partners
  - Knowing partner key decision points/thresholds and risk preferences
  - Providing consistent IDSS at national, regional and local levels

- In response:
  - NWS must work towards a Fully Integrated Field Structure based on a Collaborative Forecast Process
  - Working towards “One NWS – One Forecast” to ensure consistency and accuracy
# NWS Evolve Strategy

**NWS Vision:**

*Weather-Ready Nation:* Society is prepared for and responds to extreme weather, water, climate events

The vision is realized through the NWS mission: **Provide forecasts and warnings for the protection of life and property and to enhance the national economy**

To realize the full value of our mission and to Evolve the NWS, NWS will:

<table>
<thead>
<tr>
<th>Deepen our service to core partners: Testing and implementing the Operations and Workforce Analysis (OWA) recommendations through the NWS Program Management Office (PMO)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Enhance our science and technology capabilities: Advance NWS infrastructure, science, and technology to the “cutting edge” (e.g., next generation modeling and data assimilation systems)</td>
</tr>
<tr>
<td>Engage strategically with and grow the broader enterprise: NWS fosters partnerships at all levels, proactively harnesses external advances that benefit the mission, and enables the enterprise to grow</td>
</tr>
</tbody>
</table>

CONFIDENTIAL AND PROPRIETARY
Field-Driven Proposals to Unlock Staff Time

Involve, Engage, and Communicate with Internal and External Stakeholders Throughout!
NWS Strategic Outcome:
A Weather- and Water-Ready Nation

“Ready, Responsive, Resilient”

Becoming a Weather-Ready Nation is about building community resiliency in the face of increasing vulnerability to extreme weather, water and climate events.

- Better forecasts and warnings
- Actionable environmental intelligence
- Consistent products and services
- Connecting forecasts to decisions

Involves the entire US Weather, Water and Climate Enterprise WORKING TOGETHER

We have 4100+ WRN Ambassadors
Pulling it all together to build a Weather-Ready Nation and to accomplish our mission to save lives and property.

NWS Employees Providing Impact-Based Decision Support Services (IDSS)

Accurate & Consistent Forecasts/Warnings

Social Science

Fully-Integrated Field Structure through a Collaborative Forecast Process

National Blend of Models: Forecast starting point

One NWS, One Dissemination Network

Observations and Numerical Weather Prediction

Ready, Responsive, Resilient

Saving Lives and Property

4100+ WRN Ambassadors

Multi-faceted Communication Strategy

Deep Relationships Core Partners
Medium range products begin identifying snowstorm threat for the end of next week. NWS offices begin briefing partners on potential storm. Confidence increasing. Partner Coordination/Briefings. Fed./state/local govts make critical decisions before the snow begins. Blizzard Watches Issued. Partner Coordination/Briefings. Blizzard Warnings Issued. Schools/Govt Close. Flights Canceled. Roads Closed. Snow begins in the Mid-Atlantic. Snow forecast adjusted to include NYC in Blizzard Warning.
January 2016 IDSS Example: Long Island Expressway comparison to 2013

2013 Snowstorm

The Past

2016 Snowstorm

With NWS Impact-Based Decision Support Services (IDSS)
THANK YOU!
Vision for NWS Operations

Diagnostic findings

From the operations and workforce of today...

- Production focus, with staff operations focused on forecast “desks”
- WFO staff constrained by 24/7/365 shift requirements
- “One size fits all” staffing based on requirements of the past
- Siloed operations - each office must fully support itself
- Overlapping roles and requirements across field offices

Vision

...to a fully integrated field structure through a collaborative forecast process, involving all offices at all levels

- Service delivery focus on areas of highest impact – including analysis, forecasts, warnings, & partner support
- Local staff work hours set strategically to meet partners’ needs
- Staffing levels based on meeting partner needs
- Field offices work collaboratively to support each other and their partners
- Functions aligned to expertise, increasing role clarity and making best use of resources
Vision for Evolving the NWS through service and science: five objectives

Why evolve?

- Vulnerability of the American population to severe weather events
- Need for NWS services among deep core and core partners
- Ongoing need to continue to meet the mission of the NWS

Deepening our service to core partners

- Better serving partners by enhancing quality and consistency of IDSS at all levels of the organization, in all current locations because analysis shows 94% of partners are local
- Building a flexible and nimble workforce the NWS needs to deliver science-based services: both through enhancing skills today and hiring for tomorrow
- Improving effectiveness of forecasting in support of IDSS through a collaborative process that makes the best use of technology, reduces duplication, and ensures consistency of the forecast
- Matching workforce to workload across the organization and building a stronger organizational structure to better meet the needs of NWS partners

Enhancing our science and technology capabilities

- Supporting the innovation, science, technology, and culture required for NWS to continue improving over time