

Introduction

This document presents an initial proposal for the design of a “SOO training path” to be established for the purpose of addressing the job-related skills training of newly-commissioned NWS Science Operations Officers (SOOs) and to serve as a resource for the continued advancement of the entire SOO community. The impetus for this proposal was provided by SSD Chief Pete Browning, who requested that:

“The action should be to define the training path for the KSAs that a new SOO needs. COMAP had been the vehicle, but is very expensive. We also have independent leadership training and many science-based modules. We are looking for ways to continue to minimize residence courses. So a review of KSAs required for the job should allow us to define a training path for new SOOs with existing modules or courses.”

In response to the request, this document attempts to establish a framework for current and future SOO training. To accomplish this task, an initial effort was made to identify and categorize the knowledge, skills and abilities (KSAs) that would be desirable for the SOO position. Attempts were then made to match these qualities to existing training options in order to identify where training deficiencies exist. Finally, recommendations for long-term support of the SOO position are provided.

It is recognized that some of the recommendations presented here cannot be implemented without the necessary financial resources; however, if the SOO is going to be viewed as a leader within the NWS and the meteorological community, it is imperative that these proposals be included within the framework of a training path for the position. Providing funding for many of the identified training needs represents an investment in efficacy of the NWS SOO and the long-term viability of the SOO program within the National Weather Service.

The Assessment Process

The following was considered in drafting these recommendations:

- The SOO Training Advisory Panel (SOO TAP) report
- Previous COMAP Surveys
- Existing national SOO resources
- Existing on-line training resources
- Existing residence training resources
- Suggestions and comments from the SOO community (SOO TAP)
- The SOO Job Aid (Appendix A)

Identified SOO Job-Related Training Needs

Most SOOs are selected to the position based upon their potential to lead a science-based training program in the forecast office. SOOs are also expected to be leaders in the forecast office and critical members of the management team. The SOO is likely to be the one individual who has a holistic understanding of the impact of science and technology in the operational environment. These are the insights that assist the MIC in establishing a vision and direction for the office, maintaining morale, and ultimately accomplish the office mission. Consequently, it is essential that all SOOs have the necessary skills to facilitate the advancement of all forecast office objectives in meeting NWS goals.

Below is an outline for the training and professional development of both new and established SOOs. Many of these needs were identified by the SOO TAP after soliciting suggestions from the SOO community on the training need to execute their duties effectively and efficiently. The resources recognized by the SOO community as being as critical to the program generally fell into two categories:

- a. A basal training offering is needed for all newly hired SOOs to become familiar with the demands and expectations of a challenging position.
- b. An on-going advancement program so as the SOO matures in the position, he or she can remain viable as the science and training leader in the local office.

Within each category specific training needs were also identified, which are listed below. These recommendations are not presented in order of priority nor do they encompass the entire range of possible topics. They are intended to establish a layout for a formal training path.

Note: Existing modules identified as potential candidates to meet a training need are listed beneath each sub-category in Blue for Skillsoft on-line modules, Purple for NWS on-line modules, and Green for other training offerings. Identified training needs that could not be matched with a known offering are listed in Red.

I. Administrative Skills

This category includes the basics on the typical managerial and administrative tasks encountered by the SOO in the WFO.

- a. *Preparing biannual reports*

No Training Identified

- b. *Developing Individual Development Plans*

Supervision and Management

- Developing Career Plans for Your Technical Professionals

c. Preparing staff training schedules

No Training Identified

d. Maintaining Station Duty Manual Chapters

No Training Identified

II. SOO Personal and Professional Development

This category includes topics related to the personal and professional development of the SOO including training dedicated to the improvement of interpersonal communication and the workplace environment.

SOO Personal Development

a. Time management

Personal and Professional Leadership

- Developing Good Time Management Habits
- Strategies for Better Balance
- Techniques for Better Time Management
- You and Your Time

b. Effective communication

Communication and Interpersonal Skills

- Communicate for Results
- Communication Skills for the Workplace
- Communication Skills to Fast-track Your Career
- Interpersonal Communication: Being Approachable
- Interpersonal Communication: Listening Essentials
- Listening Essentials: Improving Your Listening Skills
- Listening Essentials: The Basics of Listening

- Strategies for Communicating with Tact and Diplomacy
- The Emotionally Intelligent Leader
- The Mechanics of Effective Communication
- The Process of Interpersonal Communication
- What Is Emotional Intelligence?

c. Morale Management

Personal and Professional Leadership

- Developing a Positive Attitude

Supervision and Management

- The Path from Pessimism to Optimism

d. Problem Solving & Decision Making

Personal and Professional Leadership

- Critical Thinking (Not currently in LMS)
- Critical Thinking Essentials (Not currently in LMS)
- Critical Thinking Skills for Managing (Not currently in LMS)
- Developing Fundamental Critical Thinking Skills
- Generating Alternatives in Problem Solving
- Generating Creative and Innovative Ideas
- Generating Creative and Innovative Ideas: Enhancing Your Creativity
- Generating Creative and Innovative Ideas: Maximizing Team Creativity
- Problem Solving and Decision Making in Groups
- Problem Solving: Determining and Building Your Strengths
- Problem Solving: The Fundamentals
- The Role of Critical Thinking in Organizations

SOO Professional Development

a. Acting as MIC

No Training Identified

b. Media training

National Weather Service Training

- Basic Briefing Training for Incident Support
- Department of Homeland Security/FEMA Training

e. Networking skills

Communication and Interpersonal Skills

- Communicate for Contacts

III. Management Skills

This category includes topics dedicated to the development of a SOO as a manager.

a. Management Fundamentals

National Weather Service Training Center

- Management and Supervision (MGT05 - **Residence**)

Personal and Professional Leadership

- Becoming a Manager
- Critical Thinking Skills for Managing
- Etiquette for Supervisors

Supervision and Management

- Management Development for Technical Professionals
- Strategies for Transitioning into Management
- The Manager as Coach and Counselor

- The Mentoring Manager
- Transitioning from Technical Professional to Management

b. Dealing with management

Supervision and Management

- Managing Upward Relationships
- Developing Strategic Peer Relationships in Your Organization
- Strategies for Transitioning into Management

c. Management supervision skills

Supervision and Management

- Models for Managing Technical Professionals

d. Strategic planning skills

Strategic Planning

- Strategic Management - Analysis and Choice
- Strategic Management - Corporate Implementation
- Strategic Management - Planning

e. Labor and union

NOAA Workforce Management Office Training

- Introduction to Labor-Management Relations
- Solving Employee Misconduct Problems

f. EEO and Diversity

EEO and Diversity

- Equal Employment Opportunity
- Getting Past Clashes: Valuing Team Diversity

- Managing Diversity Simulation

g. Team building

Team Building

- Analyzing Workplace War Zones
- Conquering Conflict through Communication
- Effective Team-building Strategies
- Effectively Communicating in Teams
- Leading Successful On-site Teams
- Manager's Performance Guide - Team Conflict Skills
- The Individual's Role in a Team
- The Path to Peace and Harmony

h. Dealing with difficult people

Business Skills

- Conquering Conflict through Communication
- Getting Past Clashes: Valuing Team Diversity

Communication and Interpersonal Skills

- Difficult People in the Workplace
- Managing Conflict in the Organization
- Working with Aggressive People

IV. Leadership Skills

This category includes topics dedicated to the development of a SOO as a leader both in the NWS as well as within the community

a. Leadership Fundamentals

National Weather Service Training Center

- Executive Leadership Seminar (ELS01 - **Residence**)

Personal and Professional Leadership

- Dynamics of Leadership
- The Leader as a Model
- The Mark of a Leader

Supervision and Management

- From Technical Professional to Leadership Simulation
- Lead and Communicate Effectively as a New Manager
- Leadership Development for Technical Professionals

Communication and Interpersonal Skills

- Leadership without Authority

b. Communication/listening skills

Communication and Interpersonal Skills

- An Essential Guide to Giving Feedback
- Communicating as a Leader
- Communication Skills for Leadership

c. Dealing with change

Personal and Professional Leadership

- Being Prepared for Change
- Leading through Change
- Perspectives on Organizational Change

V. Developing and Administering an Effective Training Program

This category includes instruction and guidance on how to select, develop, present, and track training, including the needs of adult learners and the differing modes of learning.

a. *Becoming an effective trainer*

National Weather Service Training

- Basic Reporting
- Optimizing Learning (AWOC IC Core 1)

National Weather Service Training Portal

- OPM - Training Evaluation Field Guide

Supervision and Management

- The Power of the Learning Organization

b. *Developing Office & Individual Training Plans*

National Weather Service Training

- Basic Development Plans

NOAA Workforce Management Office Training

- Building Results-Oriented Performance Plans: Module 1
- Building Results-Oriented Performance Plans: Module 2
- Building Results-Oriented Performance Plans: Module 3

c. *Coaching*

Personal and Professional Leadership

- Coaching for Performance

Supervision and Management

- Coaching Skills
- Coaching Trends
- Key Stages in Coaching
- Successful Coaching Relationships

d. Assessing staff training needs

No Training Identified

e. Conducting various forms of training

No Training Identified

f. A resource for the national distribution of training developed by the WFOs

No Resources Identified

g. Developing appropriate training materials to ensure Intern proficiency

No Training Identified

h. Developing and executing quality training utilizing standardized NWS software systems such as WES

No Training Identified

VI. Science and Technology Skills

This category includes training on how to remain current in the science through professional development, conducting literature reviews and

research, and writing papers and journal articles. In addition, it would provide information on developing collaborative relationships with other NOAA labs, Universities and the private sector partners and customers.

Computer Skills Training

a. Computer programming training

National Weather Service Training Center

- Basic LINUX Administration for WFOs and RFCs (Residence)
- LINUX Essentials Distance Learning

Information and Technology

- ANSI C Programming: Introducing C
- Getting Started with Java
- JavaScript Language Basics
- Perl Language Fundamentals
- Programming Techniques and Strategies
- Shell Scripting in Linux
- Web Development Fundamentals

b. Linux System administration training

National Weather Service Training Center

- AWIPS Systems Manager (Residence)
- Basic LINUX Administration for WFOs and RFCs (Residence)
- LINUX Essentials Distance Learning

Information and Technology

- Administrative Tasks in Linux
- E-mail and Security in Linux
- File Handling in Linux
- Hardware Configurations for Linux
- Hardware Issues for Linux

- Linux File system Management and File Sharing
- Linux Hacking
- Linux Hardware Configuration and System Maintenance
- Linux Installation Techniques
- Linux Kernel Compilation and System Startup
- Linux Security
- Linux Troubleshooting
- Networking Fundamentals
- Networking Security Fundamentals
- Security within a Linux Environment

Scientific Skills Training

- a. How-to transfer new research and technology into operations*

National Weather Service Training

- The SPoRT Center - Infusing NASA Technology Into NWS WFO

- b. Conducting on-station research*

No Training Identified

- c. Submitting scientific proposals*

No Training Identified

- d. Publishing in scientific journals*

No Training Identified

- e. Effective Technical Writing*

Communication and Interpersonal Skills

- Optimizing E-mail at Work

- Business Writing: Editing and Proofreading
- The Writing Process
- Understanding Writing Mechanics
- Writing for Technical Professionals: Effective Writing Techniques
- Writing for Technical Professionals: Preparation and Planning
- Writing with Intention

f. How to give an effective scientific presentation

Communication and Interpersonal Skills

- Delivering Your Message
- Presentation Resources Available to You
- Presenting Successfully
- Presenting to Succeed

Operational Skills Training

a. Using forecast shifts to develop and maintain forecast techniques and procedures

National Weather Service Training

- Advanced Warning Operations Course (Yes, the entire course)

b. Leading scientific forecast performance assessments, including a solid understanding of statistical techniques which is essential for forecast and warning verification

National Weather Service Training

- Introduction to TAF Verification
- Introduction to Verification of Hydrologic Forecasts
- National Service Assessment Team Training
- QPF Verification: Challenges and Tools
- River Flood Warning Verification Program

- Storm Based Severe Warning Verification Overview
- Techniques in Hydrologic Forecast Verification
- Winter Storm Warning Verification Overview - version 2

c. Conducting damage surveys

National Weather Service Training

- National Service Assessment Team Training

Current State-of-the-Science Training

a. On-line seminars presenting updates to operational systems

No Resources Identified

b. Seminars & Training on the effective use of new tools/technology in operations

National Weather Service Training

- Adding Value to NWP Guidance
- Analysis, Diagnosis, and Short-Range Forecast Tools
- AWOC Severe
- AWOC Winter
- Creating Meteorological Products from Satellite Observations
- Downscaling of NWP Data
- HYSPLIT Applications for Emergency Decision Support
- Optimizing the Use of Model Data Products
- Predicting Supercell Motion in Operations
- Real-Time Mesoscale Analysis (RTMA): What is the NCEP RTMA and how can it be used?
- Slantwise Convection: An Operational Approach

- c. *New advancements in the science with the research community*

No Resources Identified

- d. *Information of the development of operational tools by WFOs*

No Resources Identified

General Science Training

- a. *The foundations of meteorology*

National Weather Service Training

- Cold Air Damming
- Definition of the Mesoscale
- Dispersion Basics
- Jet Streak Circulations
- Landfalling Fronts and Cyclones
- Low-Level Coastal Jets
- Mesoscale Convective Vortices
- Mountain Waves and Downslope Winds
- Skew-T Mastery
- The Balancing Act of Geostrophic Adjustment
- The Use and Misuse of Conditional Symmetric Instability
- Thermally-forced Circulation I: Sea Breezes
- Thermally-forced Circulation II: Mountain/Valley Breezes

- b. *The fundamentals of radar, satellite and other observing systems science*

National Weather Service Training

- Basic Satellite Principles

- Cyclogenesis: Analysis utilizing Geostationary Satellite Imagery
- DLOC - Yes, the Entire Course
- Dual-Pol Radar Applications - The series
- Feature Identification Using Environmental Satellites
- Feature Identification: Ring of Fire
- Mesoscale Analysis of Convective Weather Using GOES RSO Imagery
- Radar Signatures for Severe Convective Weather
- SHyMet Intern series - Because it's there
- Use of GOES/RSO imagery with other Remote Sensor Data for Diagnosing Severe Weather across the CONUS (RSO 3)
- Utilizing GOES Imagery within AWIPS to Forecast Winter Storms

c. The fundamentals of NWP and the use of NWP in the forecast process

National Weather Service Training

- Bias Correction of NWP Model Data
- Effective Use of High-Resolution Models
- How Mesoscale Models Work
- How Models Produce Precipitation & Clouds
- How NWP Fits into the Forecast Process
- Impact of Model Structure and Dynamics - version 2
- Influence of Model Physics on NWP Forecasts - version 2
- Intelligent Use of Model-Derived Products - version 2
- Lightning Meteorology 1 & 2
- Model Fundamentals - version 2
- Ten Common NWP Misconceptions
- Understanding Assimilation Systems: How Models Create Their Initial Conditions - version 2

d. The fundamentals and use of ensembles in the forecast process

National Weather Service Training

- Ensemble Forecasting Explained
- Introduction to Ensemble Prediction
- Introduction to the North American Ensemble Forecast System (NAEFS)
- Understanding the Role of Deterministic versus Probabilistic NWP Information
- Use of Ensembles in the Forecast Process

e. The current state of climate and climate change research

National Weather Service Training

- Climate Change: Fitting the Pieces Together
- ENSO and Beyond
- Introduction to Climatology
- Introduction to Statistics for Climatology
- The El Nino-Southern Oscillation (ENSO) Cycle
- The Madden-Julian Oscillation Life Cycle
- The Science of Global Climate Change and Human Influences

f. A treatment of precipitation types and the forecasting thereof

National Weather Service Training

- Anticipating Mesoscale Band Formation in Winter Storms
- Heavy Banded Snow
- Lake-Effect Snow 2
- Lake-Effect Snow I
- Mesoscale Banded Precipitation
- Multisensor Precipitation Estimator (MPE)
- Precipitation Estimates, Part 1: Measurement

- Precipitation Estimates, Part 2: Analysis
- Precipitation Type Forecasting

Scientific Outreach Training

a. Conducting collaborative research

No Training Identified

b. Interactions with Academic Institutions

No Training Identified

c. NWS partnerships

National Weather Service Training

- NWS Outreach and Education Event System (NOEES) Training

g. Workshops/relations with military bases and FAA

National Weather Service Training

- Supporting Military Emergency Response During Hazardous Releases

Additional SOO Job-Related Resource Needs

I. Identify regionally available resources

During the process of determining training needs, the SOO TAP identified an apparent disparity that existed among the regions in the amount and variety of local support available to new and existing SOOs. Some regions were relatively proactive in providing the desired training and assistance to new SOOs while others have a limited support system in place. Some information of interest to all SOOs was available only regionally or not at all. Access to information regarding local, regional, and nationally available training material was dispersed among numerous web sites.

Therefore, it would be beneficial to the SOO community if these resources could be identified and made available nationally. This could be achieved through an existing portal such as the NWS training website or the creation of new SOO training site.

II. Establish a formal national SOO orientation course

The SOO TAP recognized the strong need to establish a national SOO orientation course that would focus on those skills that are critical to the position but are not being addressed through existing national training efforts. This recommendation was an acknowledgement that the duties of the SOO have evolved away from being science dominated towards those of a management-oriented position. While the COMET Mesoscale Analysis and Prediction course (COMAP) has been the established vehicle for the training of fledgling SOOs, the course has been reluctant to alter its science-based curriculum to meet those identified training needs.

The proposed course would target newly hired SOOs and provide an introduction to, and general expectations of, the position. The course should also include information on available national SOO resources, administrative duties, conducting on-station training, fostering collaborative relationships

with the academic and private sectors, and other necessary job skills. The course length should be one week or less and held on an annual or as-needed basis. Seasoned SOOs should attend to provide “real-life” perspectives.

Similar regional orientation courses can be used as model for the national offering. For example, Southern Region has offered a course dedicated to new SOOs held on a quasi-annual basis. Unfortunately, not all regions provide such support, making it necessary to offer this course on a national level in order to reduce the disparity in SOO job related training that currently exists.

III. Establish a SOO-SOO mentor program

During the process of formulating the COMAP recommendations, a strong desire for a formal SOO-SOO mentoring program was expressed. The proposed program would afford inexperienced SOOs the opportunity to work side-by-side with veteran SOOs over an extended period in order to facilitate his or her transition into the position. Since SOOs may be hired from outside the career forecaster ladder, mentors should be selected to address any deficiencies in the job skills that a newly hired SOO brings to the position. The introduction of a SOO Mentor Program will hopefully reduce anxiety-laden statements such as “I’ve just become a SOO, now what do I do?”

Through the SOO mentor program, a new SOO should gain insight in the following areas:

- How to balance the demands of local training, scientific studies, outside collaborations, personal development, operational shift work, and management responsibilities
- Establishing working relationships with an MIC, WCM, as well as Regional and National Headquarters
- Understanding local roles, if any, of the SOO in AWIPS, IFPS, WSR-88D, WWA, Warngen, etc. What are the roles of the ITO, ESA, and Focal Points in this regard?
- Planning, developing, initiating, and tracking on-station training

- How to lead and develop new interns and SCEPs
- Setting the example in your office for training and professional development
- Dealing with uncooperative employees
- Should the SOO be involved in personnel issues, if at all?
- Providing constructive verification to individuals and the whole office to enhance forecast operations
- Prioritizing training and keeping training workload manageable with the limitations of the staff's available time given shift work
- Best practices from the Mentor's forecast office, especially when dealing with the day-to-day life as well as some realistic expectations of being a SOO (i.e., you cannot do everything)