

# Guidance Document for Deploying Automated Radio Telemetry Stations on Offshore Wind Turbines and Buoys

Please rename yourself as "First and Last Name, Affiliation" by hovering over your name in the "Participants" tab and clicking Rename

## Stakeholder Workshop

### January 12, 2021



# Project Team

**USFWS Migratory Birds:** Pam Loring, Scott Johnston

**Biodiversity Research Institute:** Kate Williams, Andrew Gilbert, Evan Adams, Julia Gulka, Ed Jenkins

**Univ. of Rhode Island:** Peter Paton, Doug Gobeille, Erik Carlson, Rob Deluca

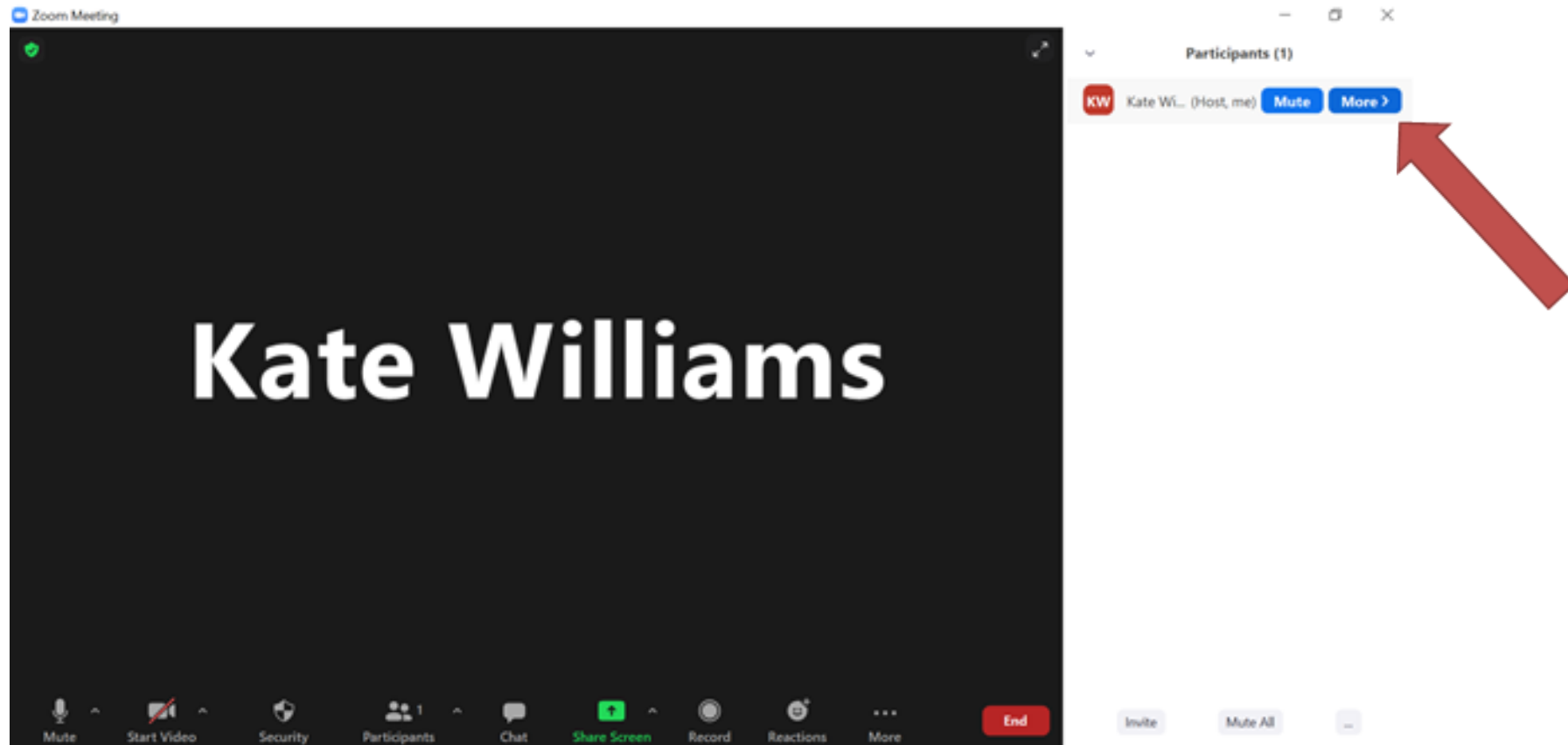
**Birds Canada:** Stu Mackenzie

**NYSERDA (funding):** Kate McClellan Press, Gregory Lampman



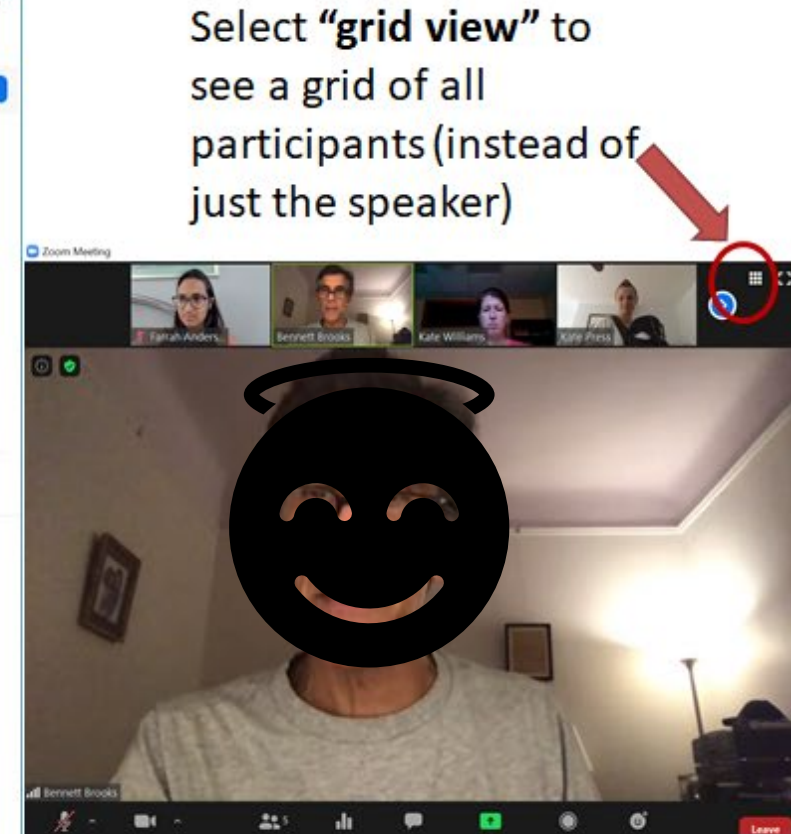
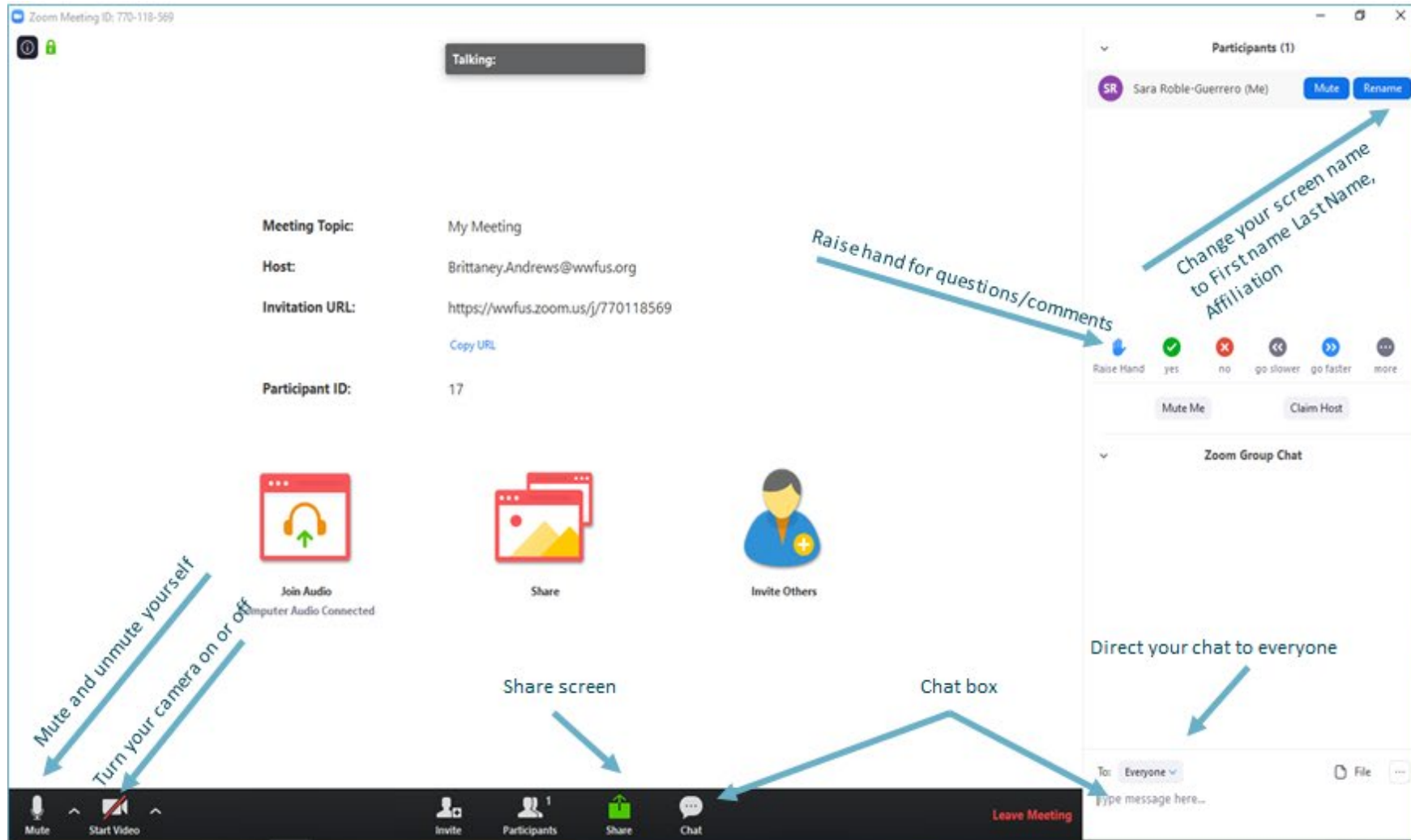
# Zoom controls

- **Please rename yourself** as "First and Last Name, Affiliation" by hovering over your name in the Participants tab



# Zoom controls

- Please mute yourself when you are not speaking
- Use the chat box and raise hand functions (or feel free to unmute and talk if that makes the most sense in the moment)



# Agenda

- 11:00-11:10 – introductions
- 11:10-11:40 – overview of guidance document and Q&A
- 11:40-11:50 – selection of breakout groups and quick coffee break
- 11:50-12:10 – breakout groups
- 12:10-12:50 – report back and full group discussion with chat
- 12:50-13:00 – next steps

# Automated Radio Telemetry (Key Terms)

- **Radio transmitters:**
  - Tags attached to birds and bats
  - Transmit uniquely-identifiable signals on shared frequency
  - Light-weight (range 0.2 to 3 g)
- **Receiving stations:**
  - Antennas elevated on mast or other type of structure
  - Data-logger records signals from tagged birds or bats flying by
  - Power source (AC or DC)
- **Motus Wildlife Tracking System:**
  - Collaborative automated radio telemetry network on shared frequencies (166 MHz or 434 MHz in North America)
  - Central hub for data from >900 receiving stations and >25,000 tagged animals worldwide

# Development of Monitoring Protocols for Automated Radio Telemetry Studies at Offshore Wind Farms

- Funded by NYSERDA (2020 – 2021)
- Standardized protocols for study design, monitoring methods, and data coordination in U.S. Atlantic



# Project Components

- **Monitoring Framework** – transmitters and study design
- **Guidance Document** – setting up and operating offshore receiving stations
- **Online Study Design Tool** – mapping detection coverage of offshore receiving stations
- **Simulation Study** – modeling animal movement data
- **Motus Data Framework** – centralized portal for data management, coordination, and summary reports



# Objectives for Today's Workshop on Guidance Document

- Introduce draft components of guidance document for **setting up and operating offshore receiving stations**
- Discuss initial questions and comments
- Breakout groups to focus on specific topics
- Next steps and opportunities to get involved further

# **Main Objectives of Guidance Document**

- Technical specifications of offshore receiving stations
- Optimal configuration of equipment
- Best practices to optimize detection range and data quality
- Maintenance and calibration of equipment
- Minimum data processing and delivery standards

# Components of Receiving Stations

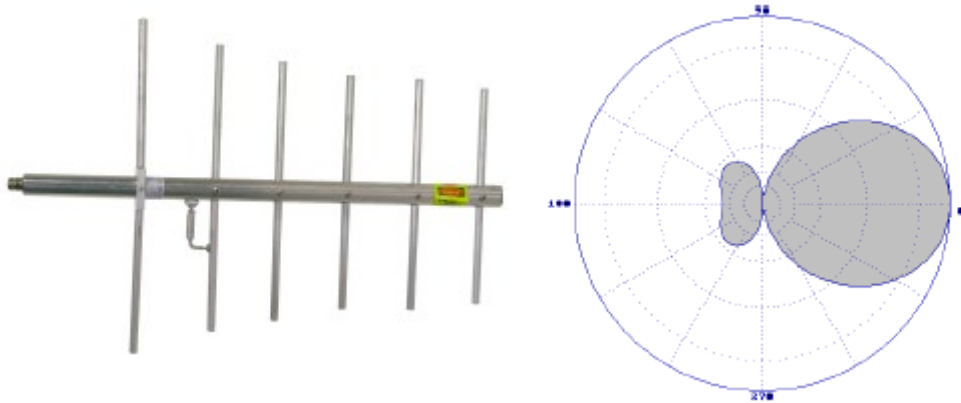
- Antenna(s) – receive signals from tagged animals
- Receiving unit – log data on signals received (tag id, timestamp, receiving antenna id, signal strength)
- Power source – continuous power supply to receiving station (AC or DC)

# Technological Specifications of Antennas

- Type of antenna
  - Omni-directional – circular beam pattern (lantern)
  - Yagi – directional beam pattern (flashlight)
- Gain (dB) - size of antenna and detection range
- Operating frequency
  - Two frequencies on Motus network: 166 or 434 MHz
  - Tune antennas to optimize reception to single frequency

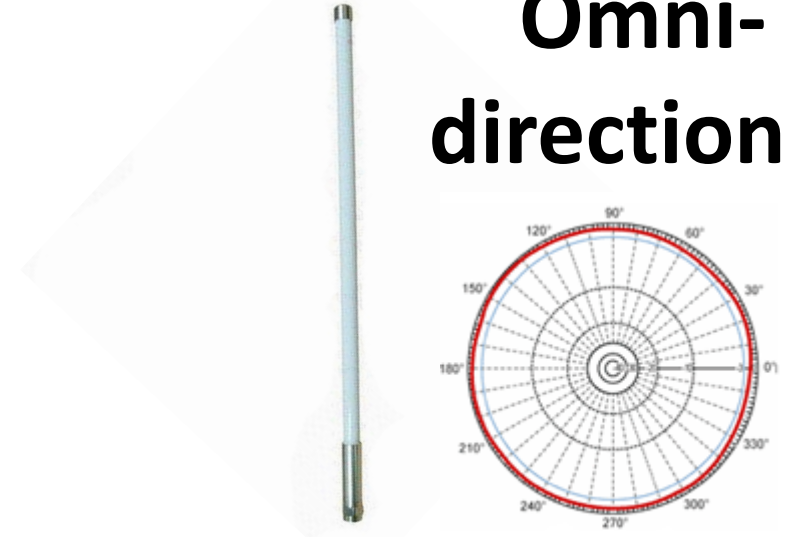
# Recommended Specifications of Antennas

## Yagi



- Gain 11-dBi, detection range <5-15 km
- On offshore wind turbines, recommend array of four Yagis/station for directional data

## Omni-directional



- Gain 5 dBi, detection range <500 m
- Recommended for stations on buoys (where space limited) and turbines (in addition to Yagi array)

# Antenna Mounting Recommendations

- Antennas should be attached to an elevated mast that provides line-of-sight to the surrounding airspace
- To reduce obstruction or interference of signals, there should be no metal or other objects between the antennas and surrounding airspace
- Mount antennas close to receiving unit to reduce signal loss
- Use low-loss cable (LMR-400) and waterproof all connections

# Receiving Unit Specifications

- Records detection data: time stamp, receiving antenna, tag ID, signal strength
- Remote data access is key for offshore sites
- Preferred options, if available on site: LTE, WiFi, or Ethernet
  - All data sent to Motus four times a day
- Alternative option: Satellite Connectivity (Iridium)
  - Daily summary data of tag detections and system health (e.g. voltage)

# Field-testing Equipment (Spring/Summer 2021)

- Currently testing equipment on land (winter 2021)
- Field work on Block Island (spring/summer 2021)
  - Two land-based stations adjacent to Block Island Wind Farm
  - Station on wind turbine at Block Island Wind Farm
- Ground truthing – flying test tag from kite behind boat
- Double-tagging gulls with GPS and radio-tag (434 MHz)

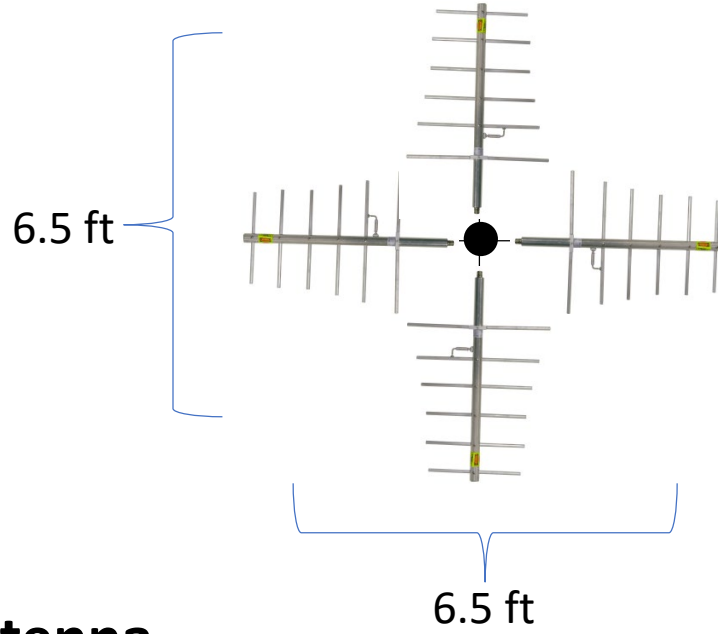


# Antenna Configuration for 2021 Field Testing

## Four Yagi antennas

Arranged in radial configuration (90-degree separation of main beams)

View of four Yagi antennas  
(from above)



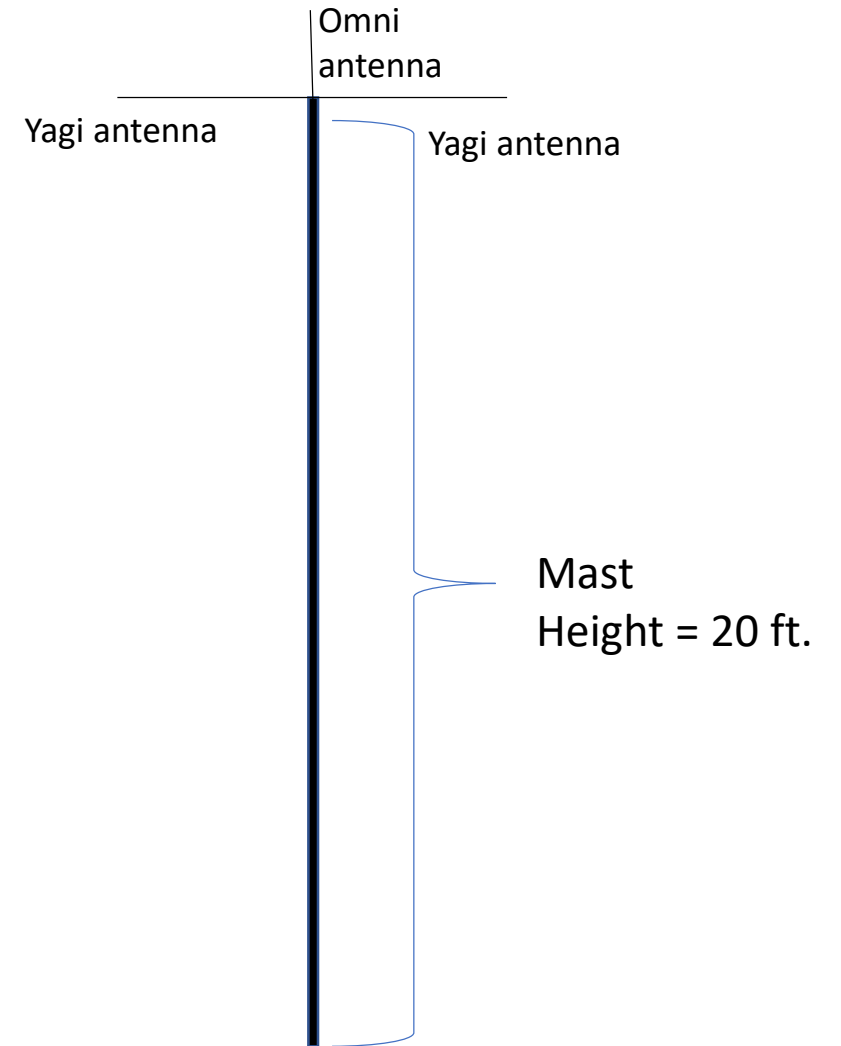
## One omni-directional antenna

Mounted vertically in center of Yagi array

Omni antenna  
Height = 2.8 ft



Antenna array on mast  
(side view)



## Field-testing offshore buoy stations

- Spring 2021 – U.S. Wind and Ocean Tech Services deploying automated radio telemetry system on met buoy off coast of MD
- Receiving station with omnidirectional antenna (5-dBi) connected to power source on buoy
- Satellite data plan for daily summary/system health updates
- Quarterly service visits to the buoy to download all data and upload directly to Motus

## **Other Sections of Guidance Document (in development)**

- Ground-truthing to quantify detection range of antennas
- System operation and maintenance
- Data processing and delivery standards: station metadata, ground-truthing data, tag detection data, and system maintenance/health reports
- Standards for periodic reporting (e.g., quarterly, annual)

# Guidance Document Timeline

- Summer 2020: began initial outline of sections
- Fall 2020: Project Advisory Committee (PAC) formed
- Winter 2021 – Summer 2021: Field-testing methods, drafting sections with input from PAC and results of field tests
- Fall 2021 – draft Guidance Document for stakeholder review
- Early 2022 – final Guidance Document released to web

# Q & A on Guidance Document Overview (11:30 – 11:40)

## Objectives:

- Technical specifications of receiving stations
- Optimal configuration of equipment
- Best practices to optimize detection range and data quality
- Maintenance and ground-truthing of equipment
- Minimum data processing and delivery standards

# Breakout Groups

**Goal:** 20-min brainstorming session to capture ideas around focal topics

**Participants** select group/topic to join at beginning of break

**Facilitators** will guide discussion topics and take notes

**Reconvene** in main session for report-out and further discussion

# Breakout Group Topics – Please select a group # to join

## **1) Optimizing technology (Facilitator: Doug Gobeille, Univ of RI)**

*Goal:* Identify recommendations for configuring stations to optimize detection range and data quality

Suggested participants: Electrical engineers, automated radio telemetry practitioners

## **2) Coordination of guidance into monitoring plans (Facilitator: Kate Williams, BRI)**

*Goal:* Discuss coordination among stakeholders to implement guidance in offshore wind monitoring programs

Suggested participants: representatives from agencies, NGOs, industry

## **3) Integrating systems (Facilitator: Andrew Gilbert, BRI)**

*Goal:* Identify processes to integrate automated radio telemetry systems into design of offshore structures

Suggested participants: Offshore wind energy engineering and industry representatives

## **4) Ground-truthing automated radio telemetry systems (Facilitator: Pam Loring, USFWS)**

*Goal:* Brainstorm recommendations for ground-truthing the detection range/coverage of offshore systems

Suggested participants: automated radio telemetry practitioners, engineers, researchers

## **5) Metadata standards (Facilitator: Evan Adams, BRI)**

*Goal:* Brainstorm best practices for station metadata and system health data that could be applied to developing minimum data standards

Suggested participants: environmental consultants, data scientists, Motus collaborators

Select your preferred breakout group for yourself once host opens the breakout rooms

Once you have selected your group, take a quick break before beginning discussions



Kate Williams

OR put your preferred breakout group number at the beginning of your name: "3 - Kate Williams, BRI"



Kate Williams



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## **Next Steps for Guidance Document**

- Incorporating stakeholder input into draft guidance document
- Field tests at Block Island Wind Farm and offshore buoys in spring/summer 2021
- Draft guidance document for review in fall 2021
- Final products released to web in early 2022

# Upcoming Virtual Stakeholder Workshops

- Study Design Tool - tomorrow
- Monitoring Framework – Spring 2021
- Motus Workshop – Summer 2021
- Draft study products – Fall 2021
- Stay tuned for updates via email

# Thank you!

## For additional information, please contact:

- Pam Loring, USFWS ([pamela\\_loring@fws.gov](mailto:pamela_loring@fws.gov))
- Kate Williams, BRI ([kate.williams@briloon.org](mailto:kate.williams@briloon.org))

Photo credit: Kate Sutherland

