

# Radar Monitoring: Methods and Applications

New England  
chapter of The  
Wildlife Society,  
October 24, 2013

Sarah Boyden  
Stantec Consulting  
[sarah.boyden@stantec.com](mailto:sarah.boyden@stantec.com)



# What are the questions?

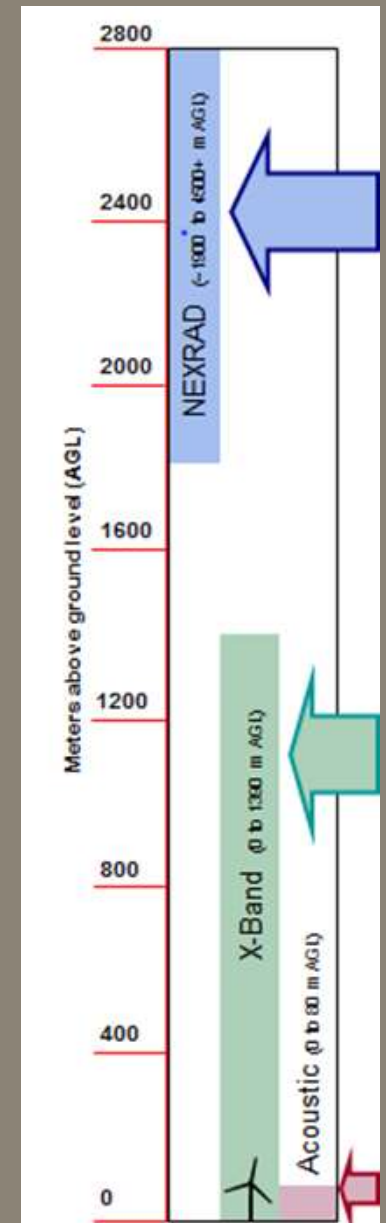
- How effective is radar as a tool?
  - Individuals?
  - Birds and bats?
  - Identification?
- How does migration occur?
  - Concentrated along land features?
  - Broad front?
- When does migration occur?
  - Timing of peak migration?
- How high, or low, do targets fly?
- Does the presence of obstructions affect flight height?





# Current/Future Methods

- Marine Radar
- NEXRAD
- Dual-Polarimetric NEXRAD



# Marine Radar Capabilities

- Large survey area
- Continuous data collection
- Nightly traffic rates (t/km/hr)
- Full season traffic rates (t/km/hr)
- Flight direction
- Flight height
- Percent below max turbine height  
consistent methods (when  
properly deployed)
- pre- and post-construction



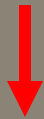
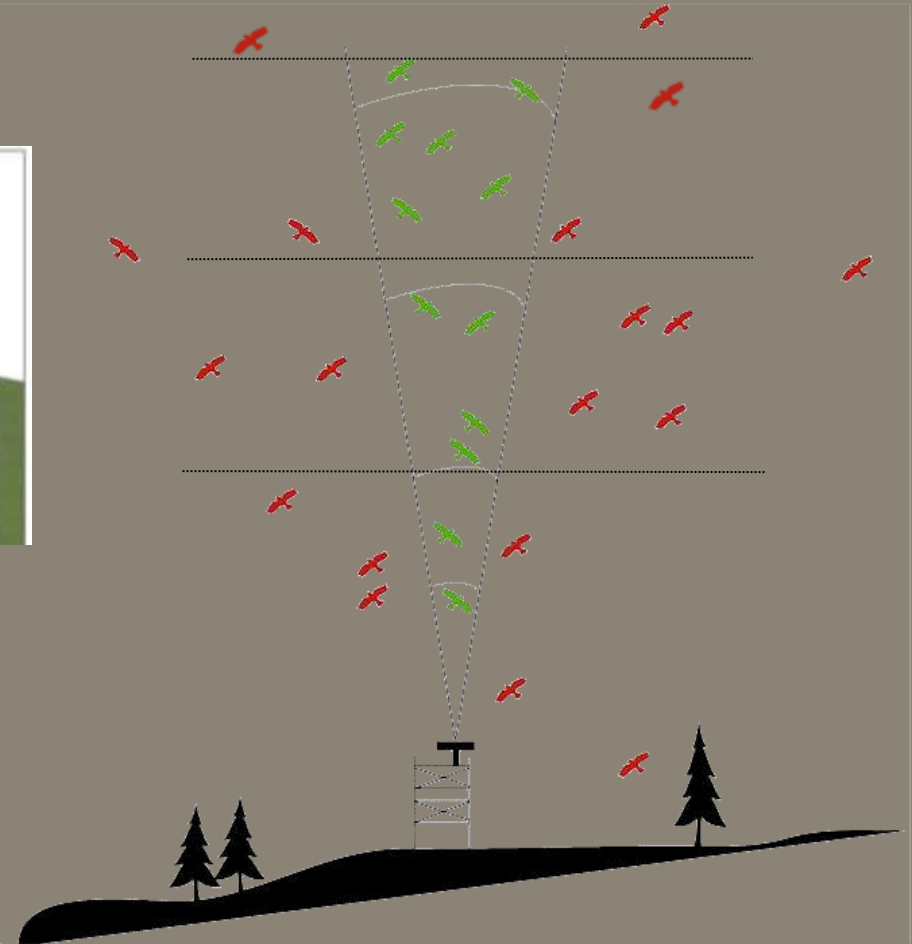
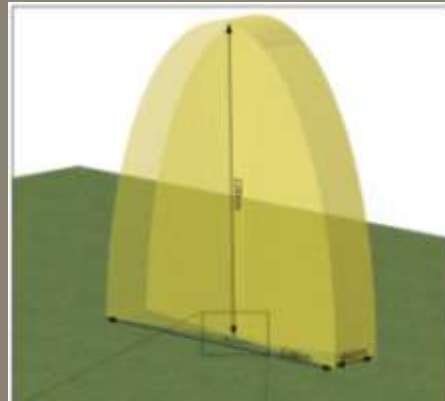
# Radar Deployment Is Crucial





# Radar Operation Modes

## Vertical Mode



- Average flight height
- Percent below turbine height



0.17J  
0.25NM  
JLSE2 S1P  
J RM

SPD MAN 00.0KT

REL TRAIL 30S  
X-BAND

+ 0.0°  
0.000N

TTG \*\*:\*\*\*  
OWN SHIP (GP

CSE

WPT

TTG \*\*:\*\*\*

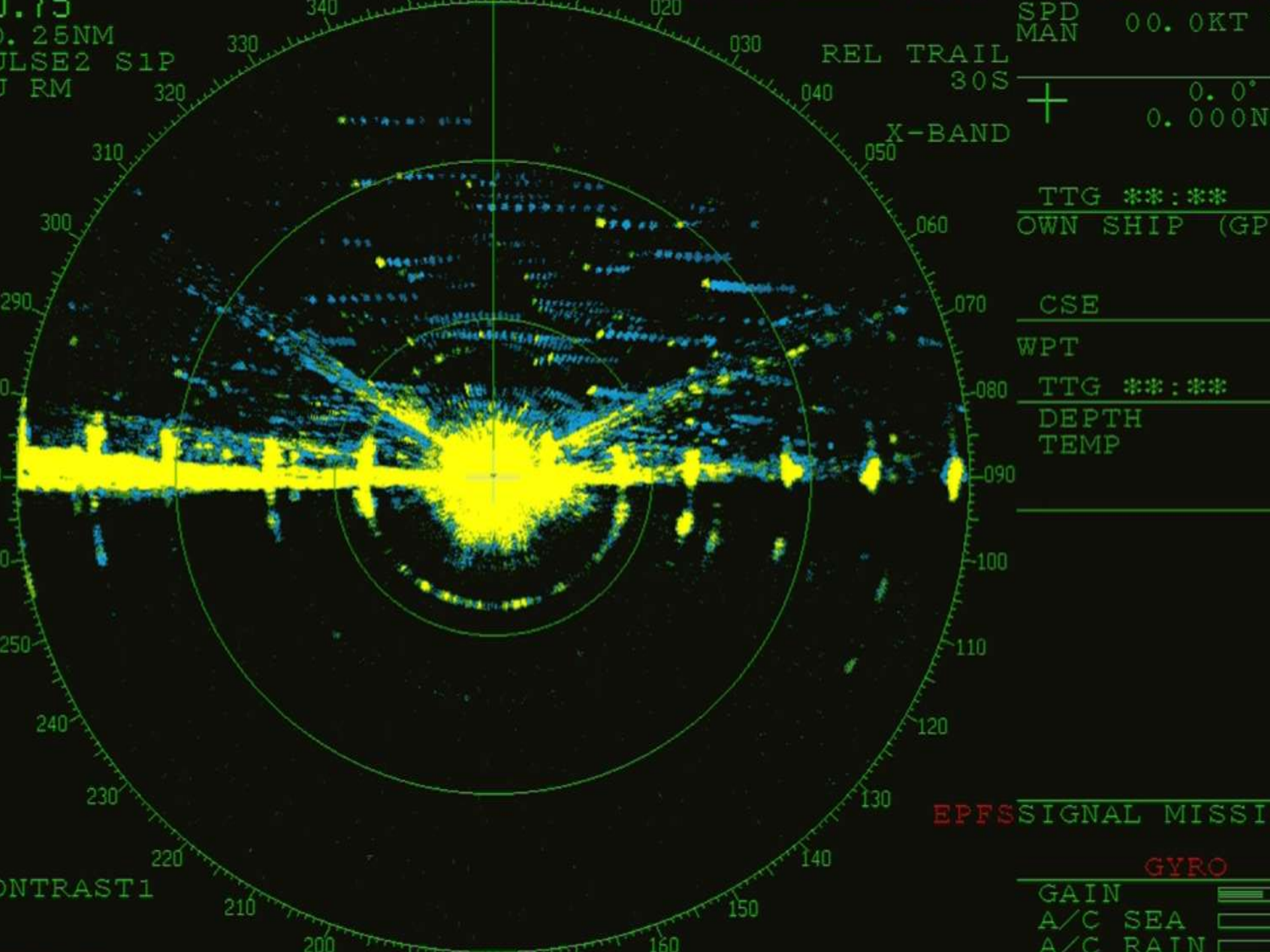
DEPTH  
TEMP

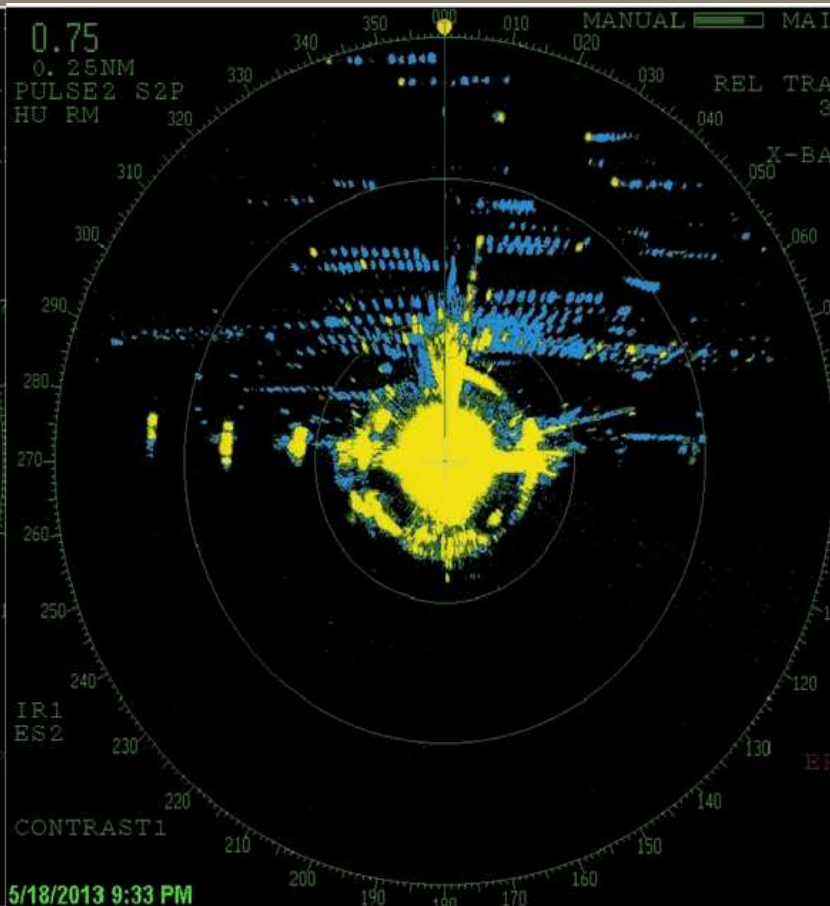
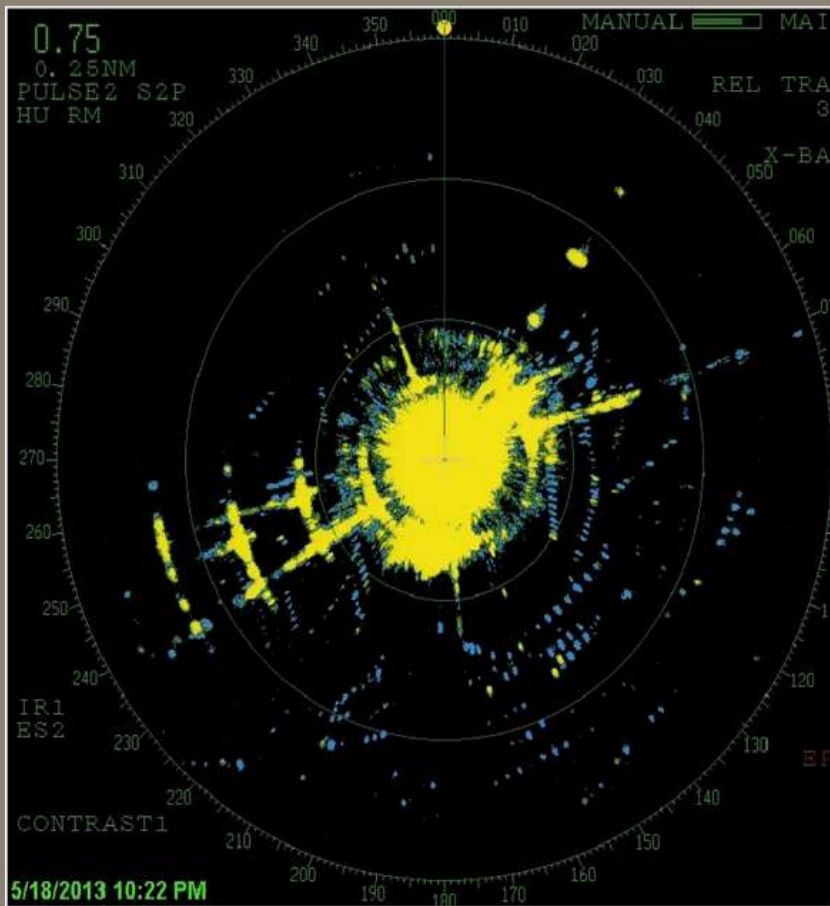
EPFS SIGNAL MISSI

GYRO

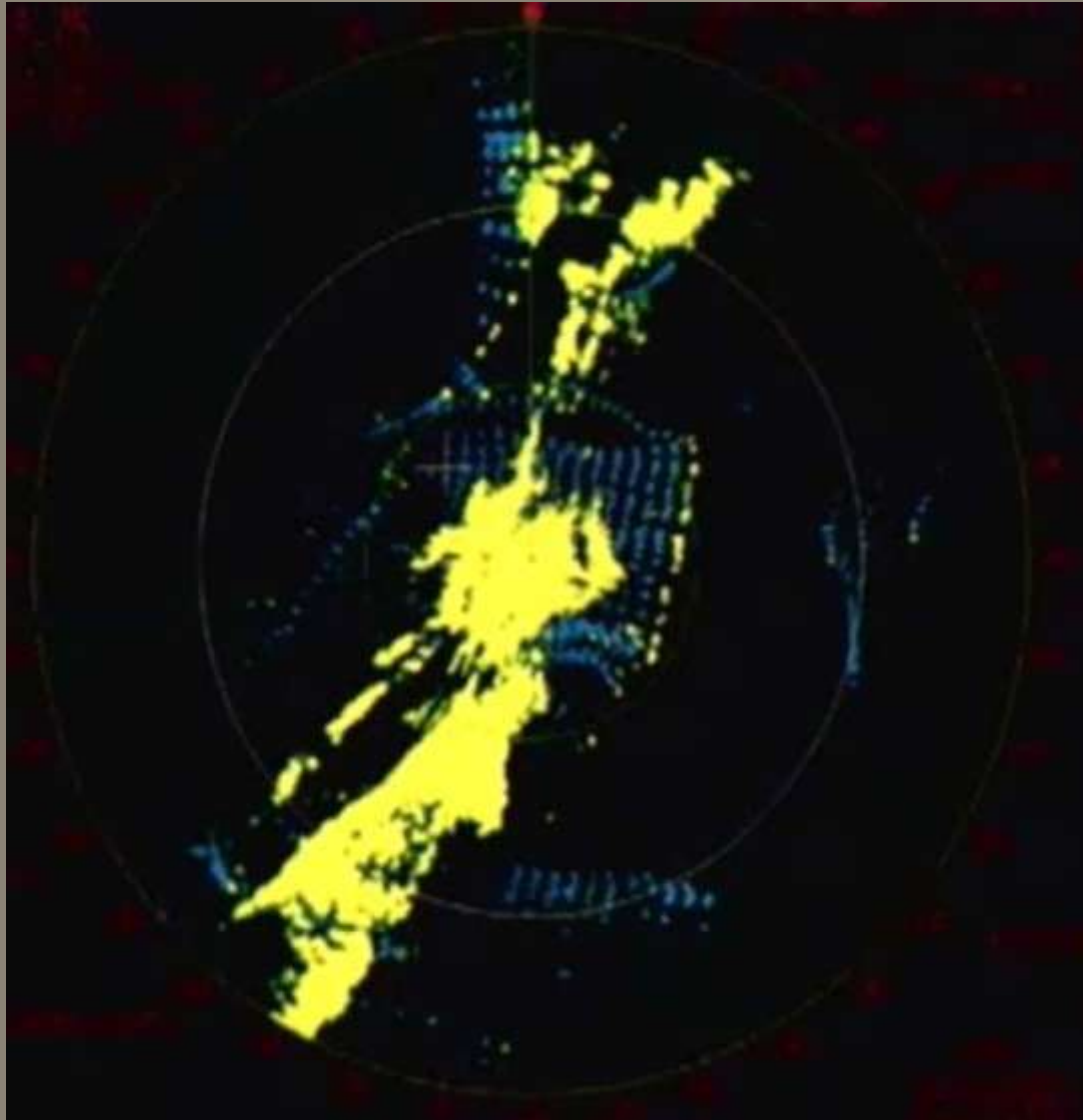
GAIN  
A/C SEA  
A/C RAIN

CONTRAST1

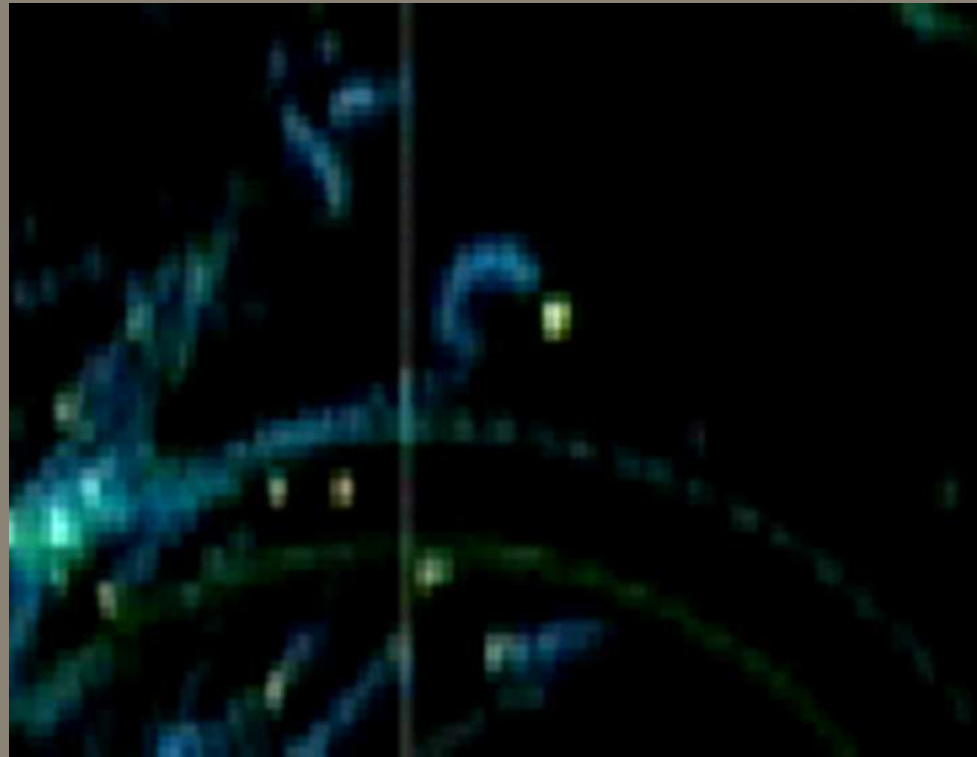
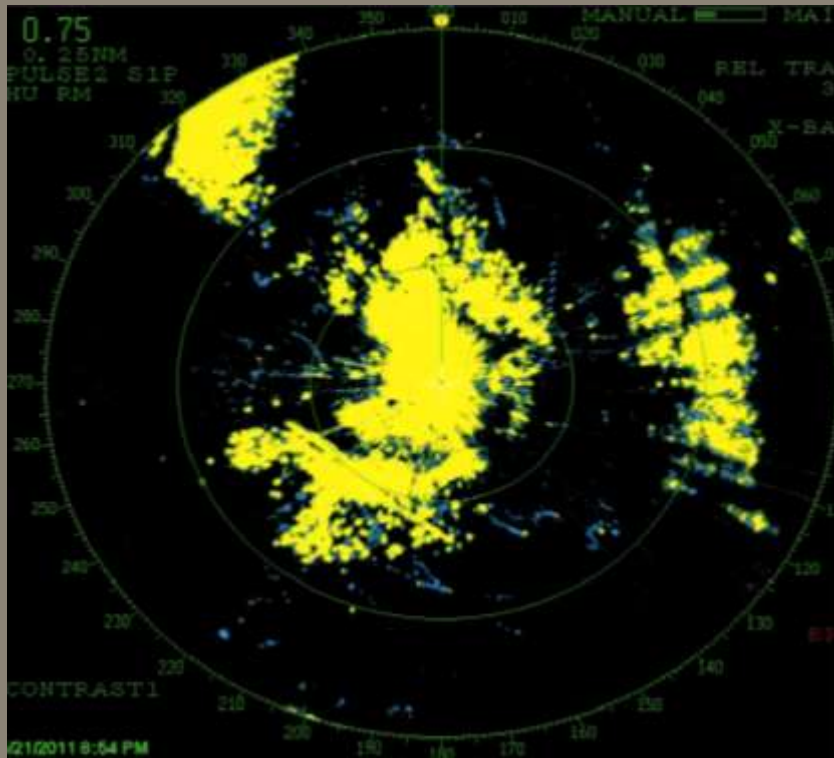




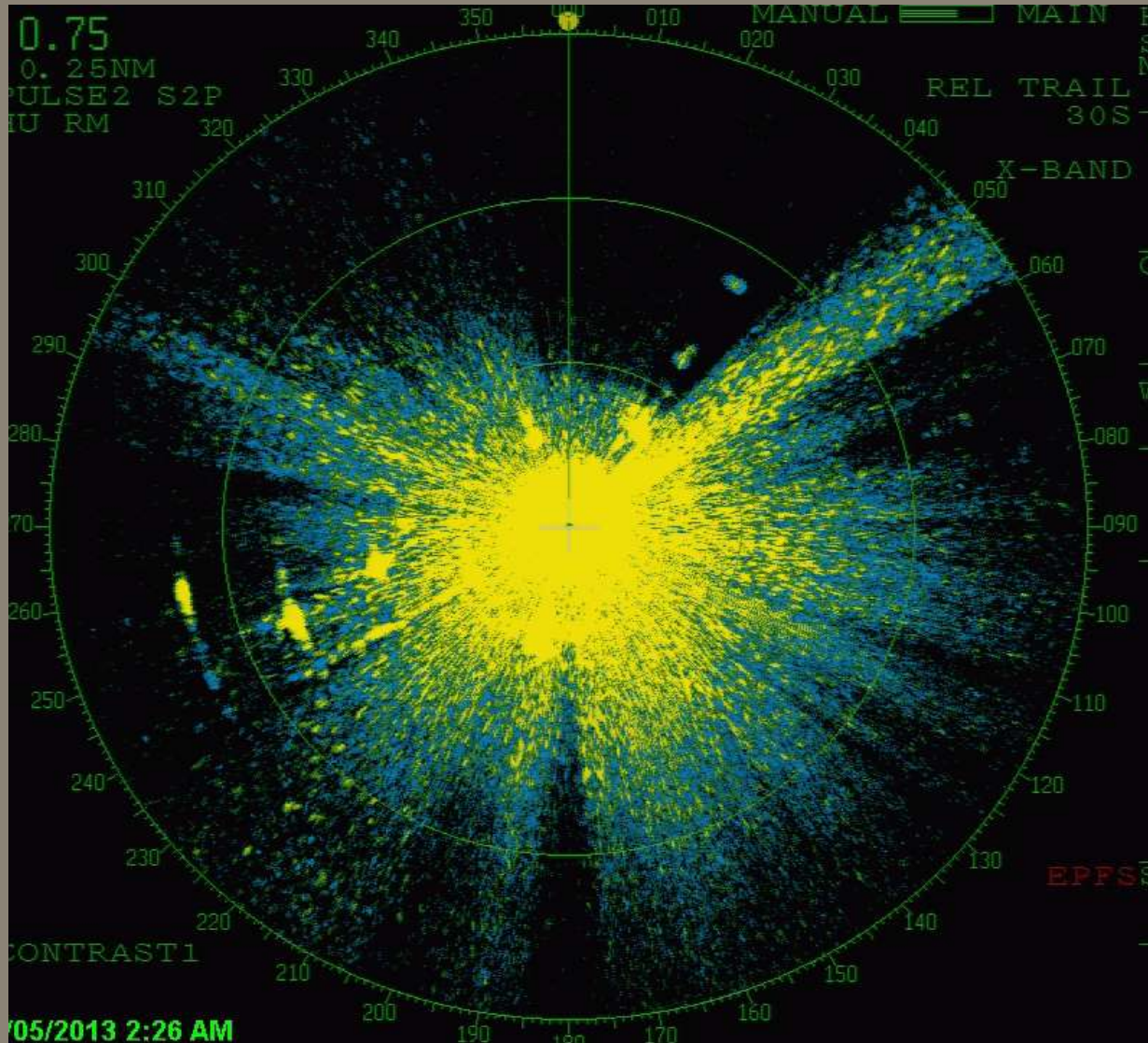
# Documenting Migration



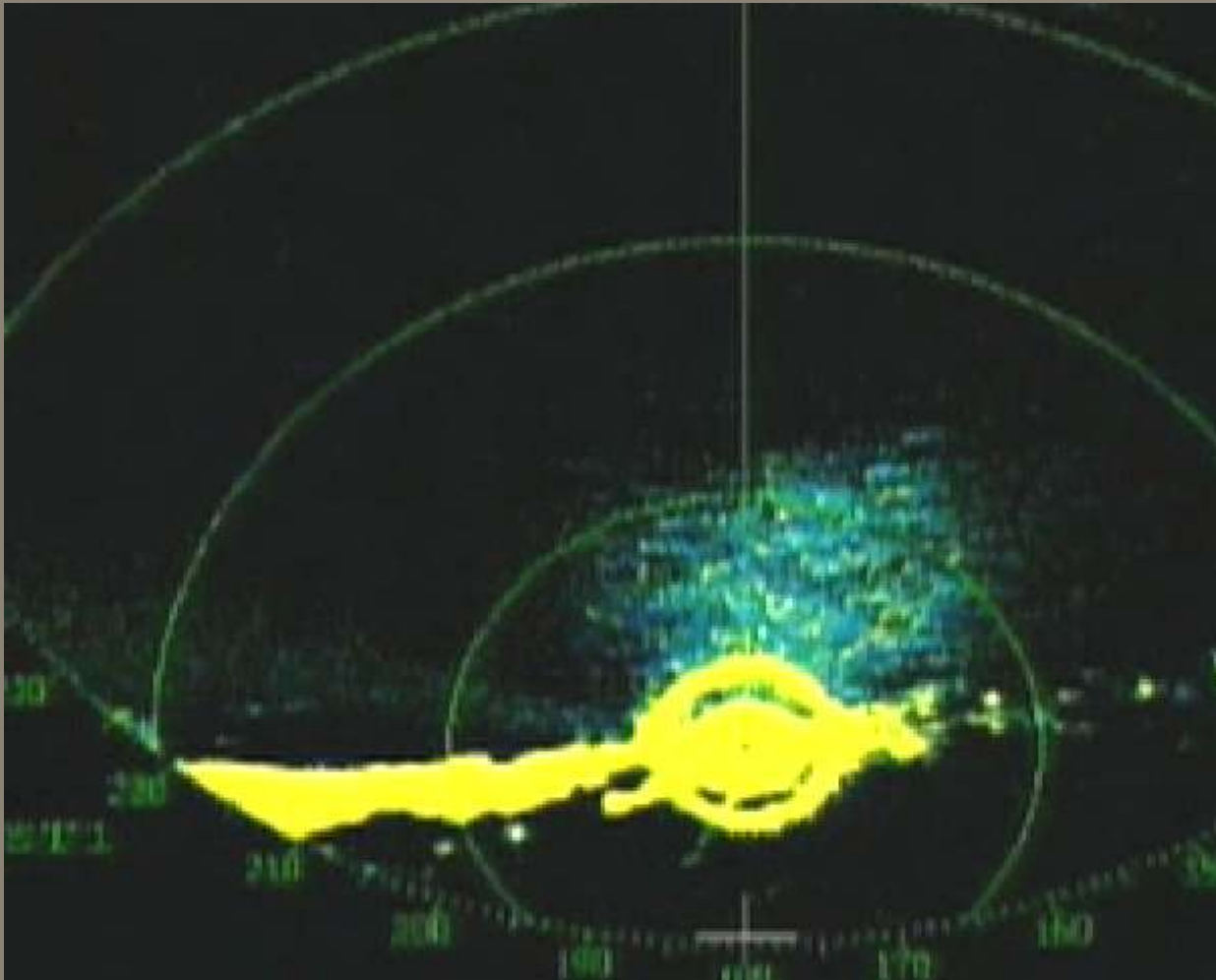
# Is Target ID Possible?



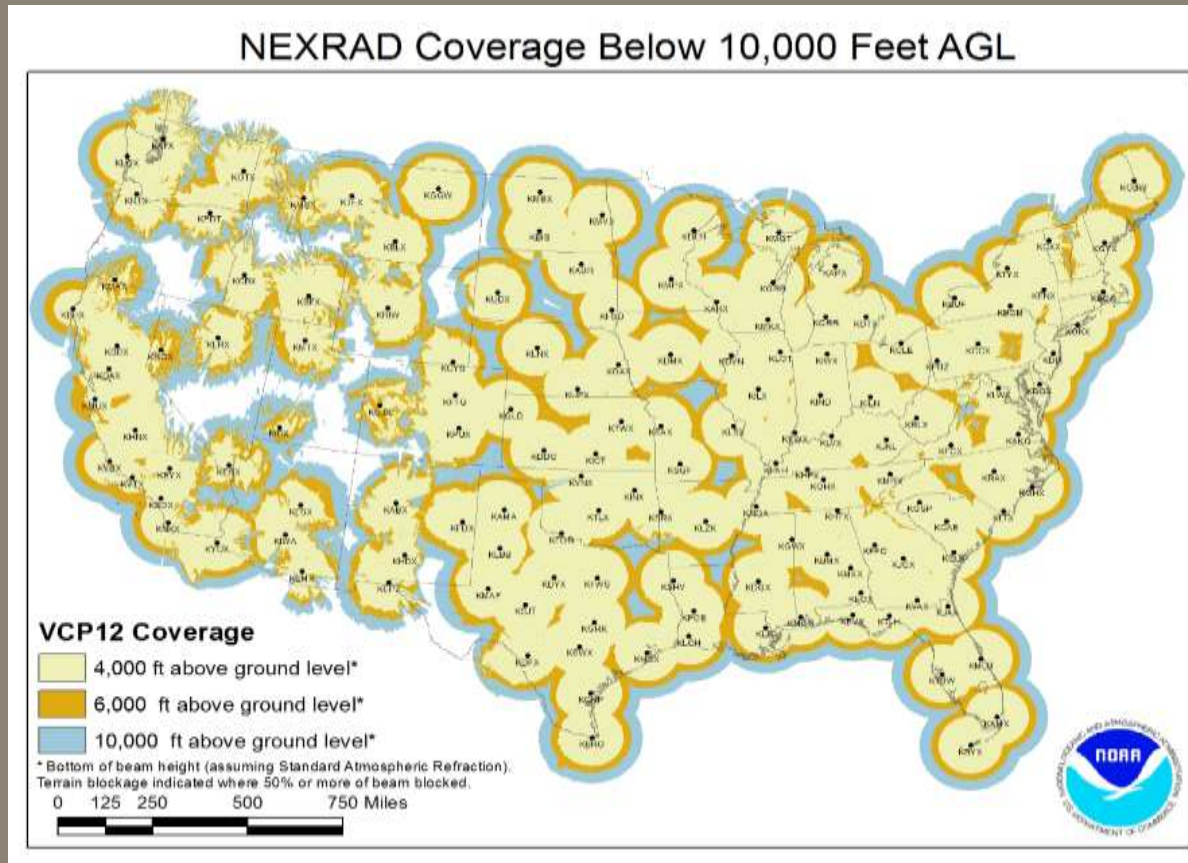
# Weather Limitations



# Insect Activity

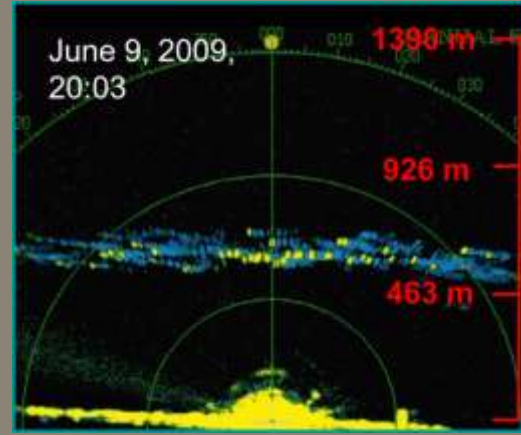
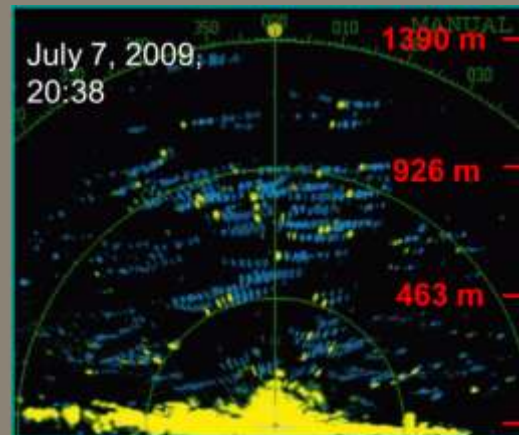
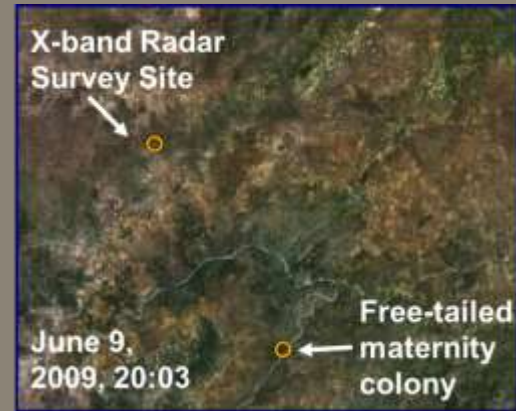
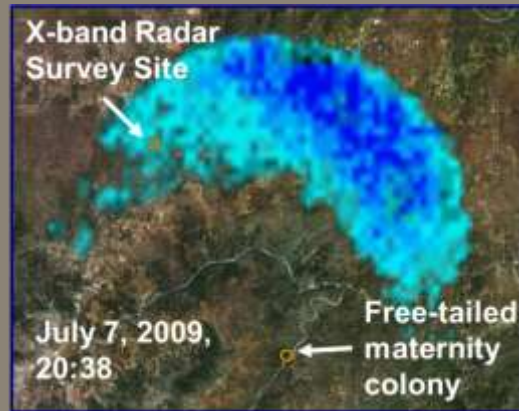
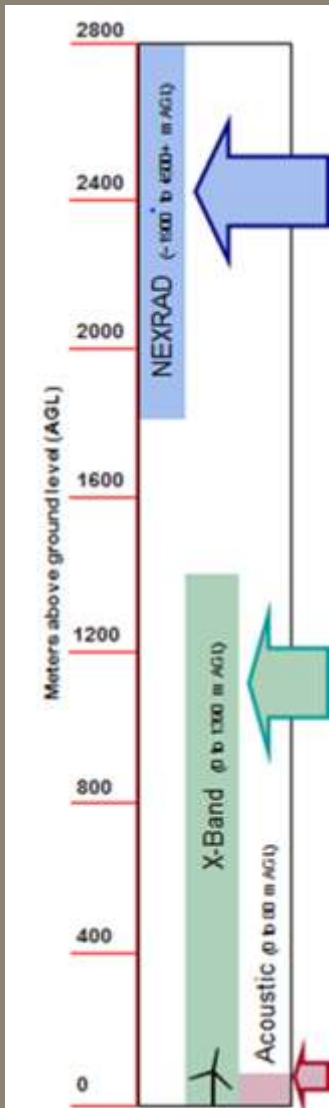


# NEXRAD Weather Radar



<http://opwx.db.erau.edu/faculty/mullerb/Wx365/NEXRAD/WSR-88DCONUSCoverage2011.jpg>

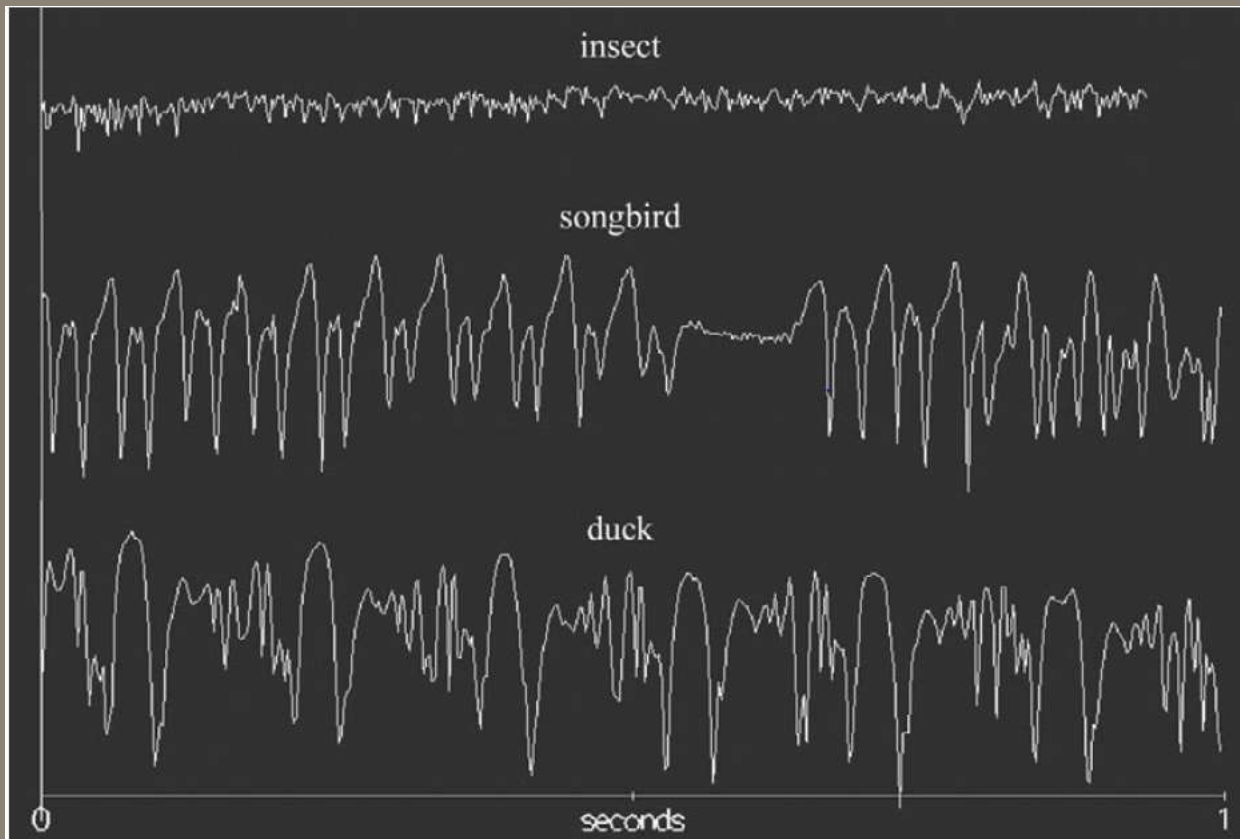
# NEXRAD Weather Radar





# The Future

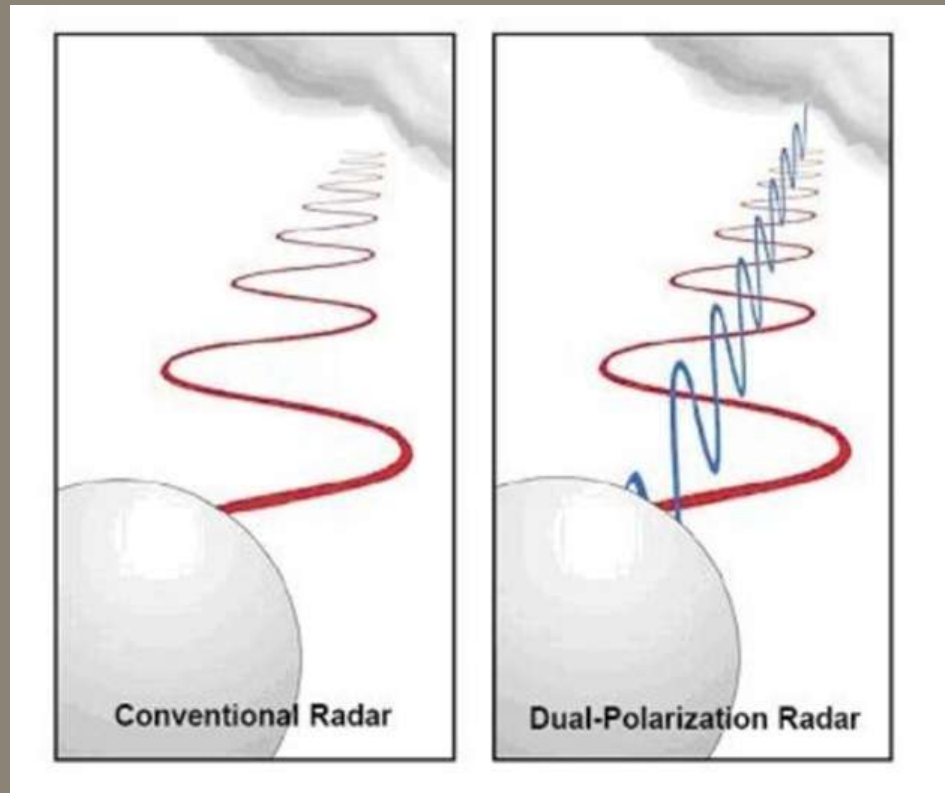
## Wing beat analysis



<http://journals.ametsoc.org/doi/abs/10.1175/BAMS-D-11-00099.1>

# The Future

Dual polarization upgrade



# Questions?

