

Emergency Managers and Probabilistic Forecast Products: End users, their needs & requirements

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Who are our “End Users”?

- Public(s)
- Emergency Managers
- Others?

Public Use of NHC Products

Hurricane Ivan: Post Storm Assessment

- 78-85%: NHC watches/warnings “an important factor” in evacuation decision...
 - ~ 50% could not identify meaning of “Hurricane Watch” or “Hurricane Warning”.
- 95-97% saw the hurricane’s forecast on television...
 - 90% said it was an important factor in their evacuation decisions:
 - 64% reported seeing a cone
 - 12% saw a line
 - 24% saw both

Hurricane Ivan: Post Storm Assessment

Reasons Given for Evacuating

- Concerns about safety of home 19%
- Official advice 17%
- Storm track 13%
- Storm severity 9%
- Storm experience 7%
- Friend or relative advice 7%
- Media advice 7%
- NHC advisories 5%
- Other 16%

Emergency Managers

Who are they?

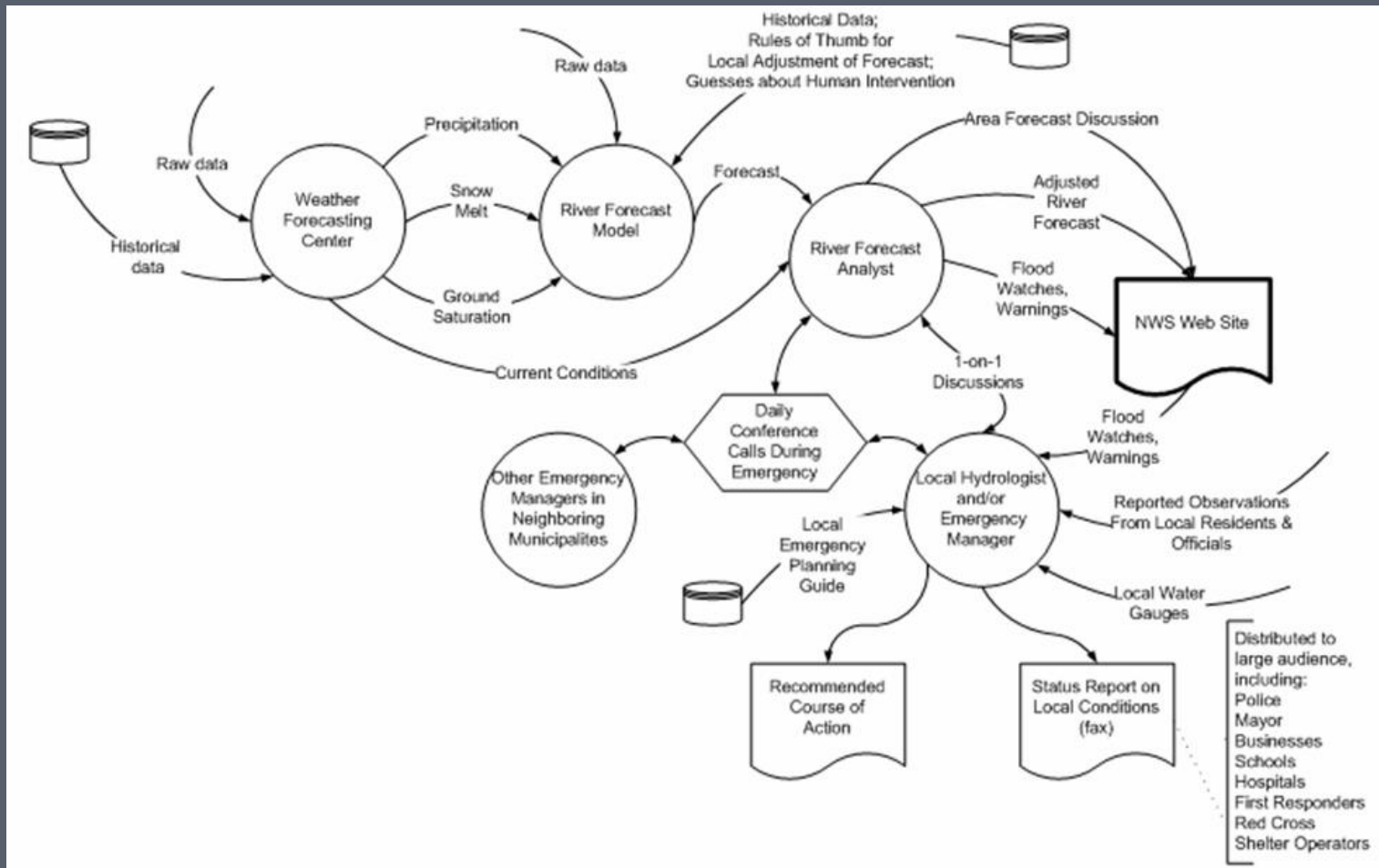
What do they use?

How do they use it?

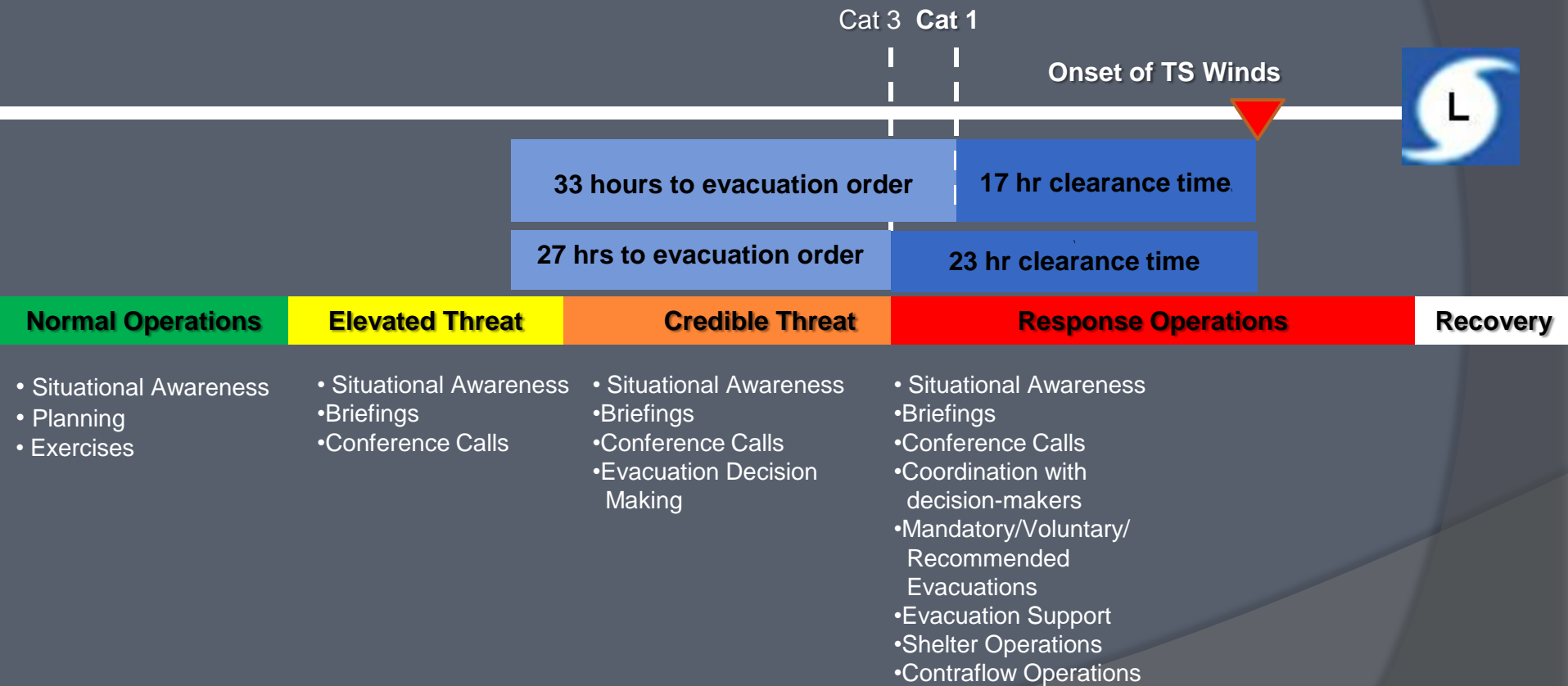
When do they need it?

Emergency Manager “Stereotype”	The “New Generation” Emergency Manager
Not college educated (4-year degree)	College educated—many with EM degrees
Middle to late middle-aged	More professional and knowledgeable
Emergency management is second or third career	Knowledge base: science and research
Job obtained other than with EM Competencies	Technologically more proficient/adept
Spend EM career in one jurisdiction	Younger
Disaster response planning-oriented	More diverse and culturally sensitive
Works primarily with emergency services	Emergency management is career of first choice
Bureaucratic	Building disaster-resistant communities focus
Plans <i>for</i> jurisdiction (primarily disaster response-oriented)	Proactive
Has not done a risk assessment	Lifelong learner; reads disaster literature
Has not done a mitigation plan	Joins professional associations
Has not done a strategic plan	Plans <i>with</i> jurisdiction stakeholders
Has not joined an EM professional association	Better paid
Doesn't read disaster research literature	Better funding for EM programs
Knowledge base is experiential	Upwardly and geographically mobile
Frequently wears other hats	Broader range of working contacts
Not well-paid or funded	
Many part-time and volunteer positions	

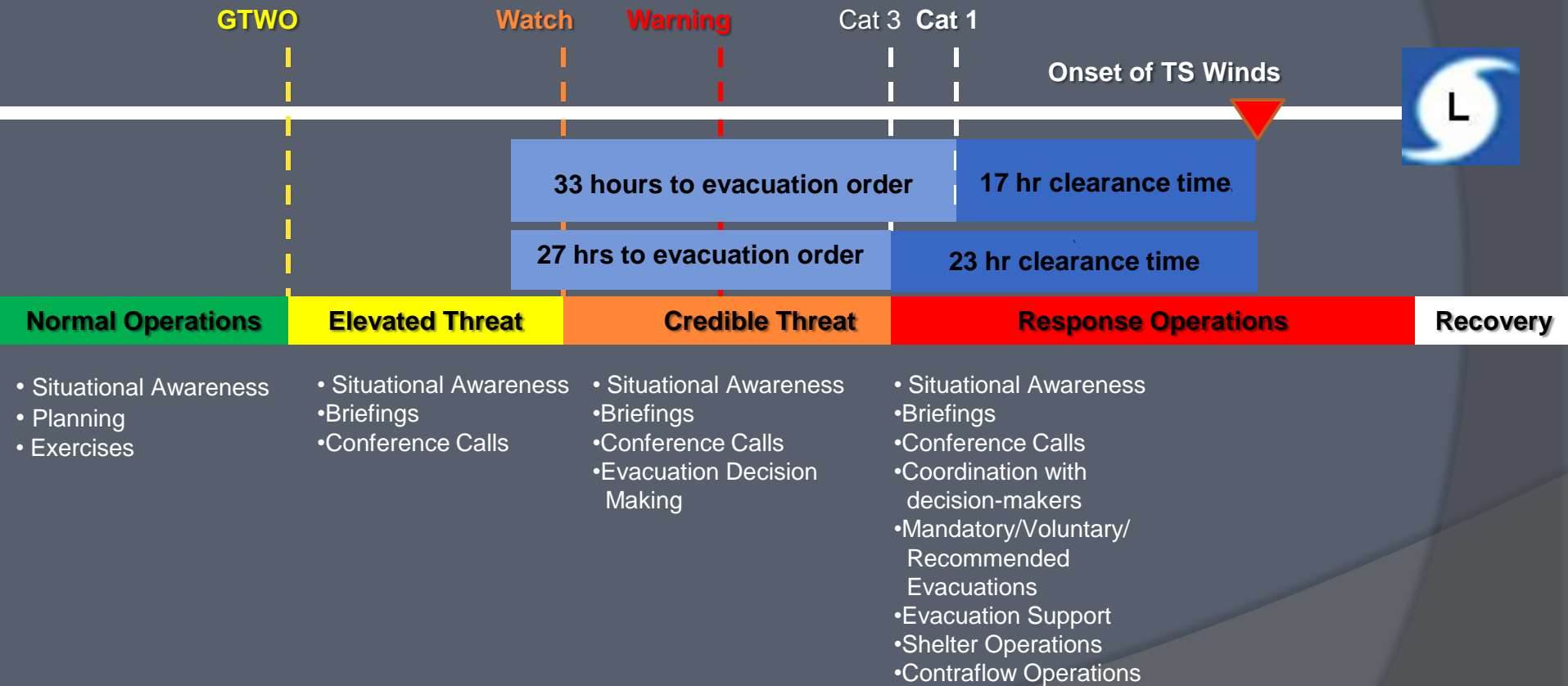
Information Flow (?)



Decision-making process



Decision-making process



Survey

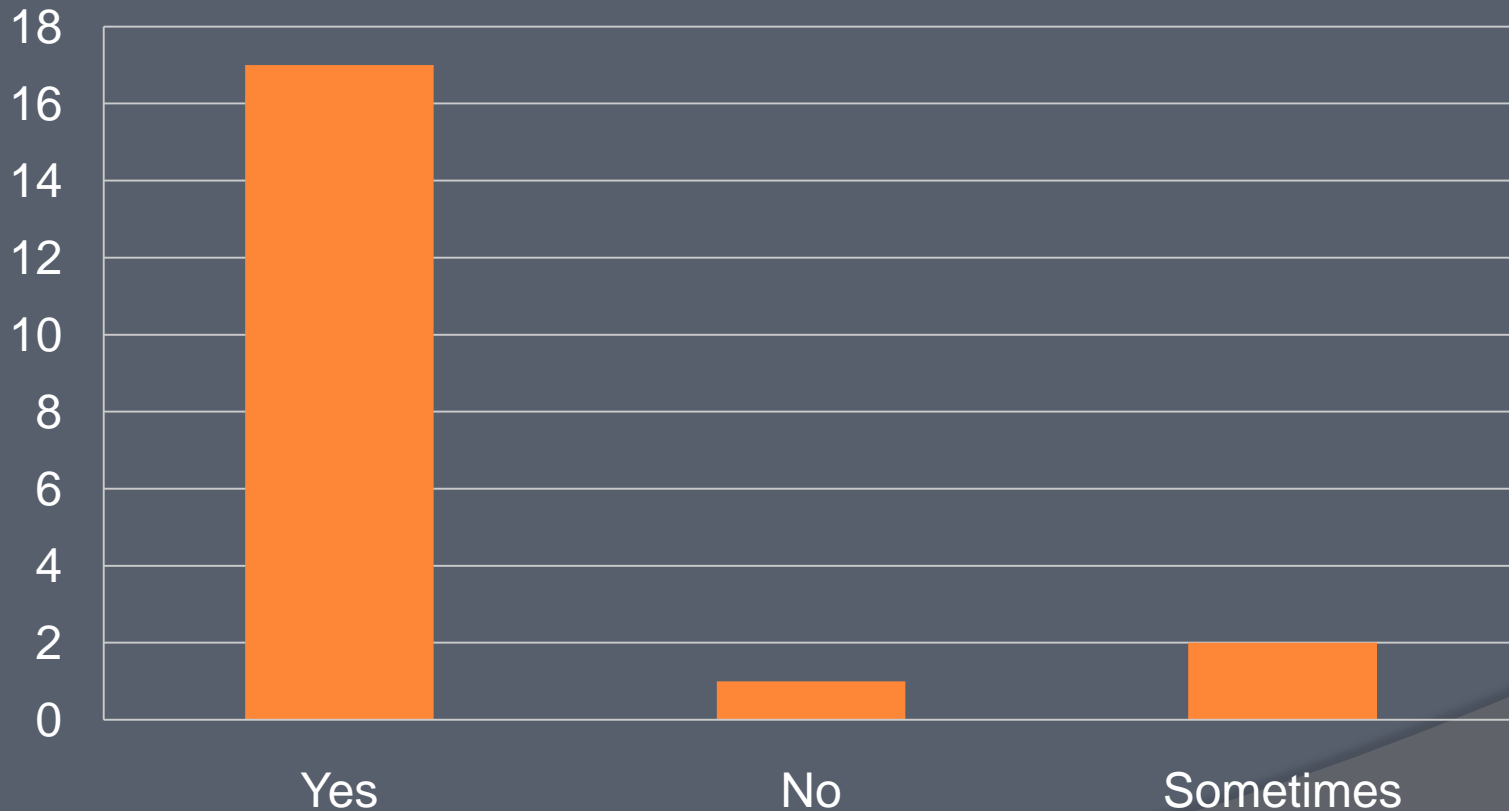
Emergency Management Use of Probabilistic Products

Wind Speed Probabilities



Wind Speed Probabilities

Do you use this product in decision-making?



Wind Speed Probabilities

- Please describe, in your own words, the information being conveyed by this product:
 - “Shows the cone of uncertainty of hurricane force winds over the next five days”
 - “Storm forecast (intensity, size, wind speed)”
 - “Forecast track and error cone swath”
 - “Probable wind speeds at generally different locations and times”

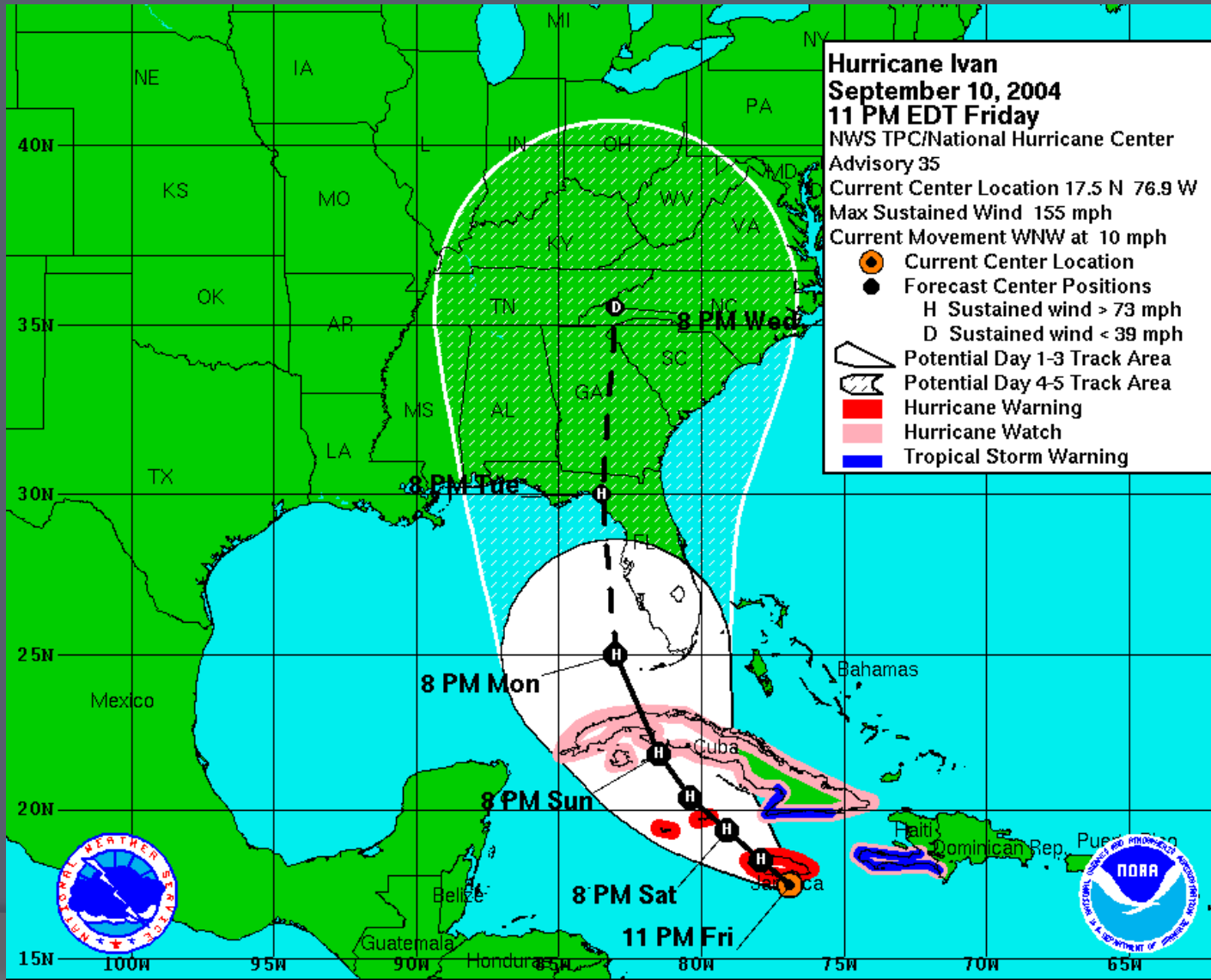
Wind Speed Probabilities

- Have you used this product before?
 - “Yes, we have used it before and use the 30% as a trigger point for protective actions.”
 - “Used it for presentations to staff and elected officials to justify the decision making process.”
 - “Yes with some early voluntary/optional evacuation discussions”
 - “Yes, used to aid in decision making for evacuations and deployment of resources.”

Wind Speed Probabilities

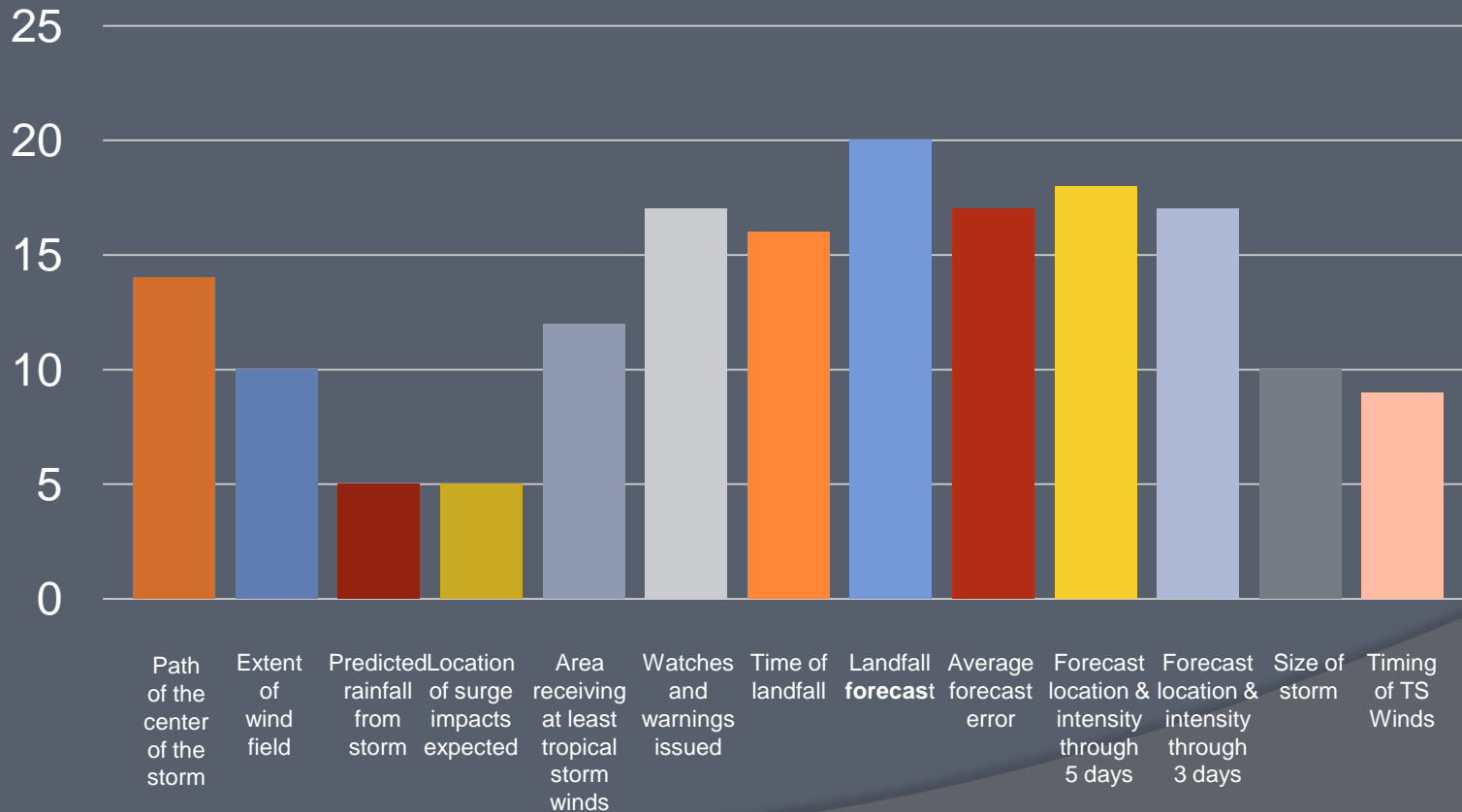
- Have you used this product before?
 - It's a good graphic to use when explaining the probabilities to elected officials and others being briefed on the possibility of hurricane force winds.
 - We use any and all tools to make the difficult evacuation decision. The probable winds expand our view past just the projected path of the storm.
 - We're an inland county... This does give us a very rough idea as to what we might expect. It's but one piece of information for decision-making. This far out in time we'd be more interested in TS force wind probability.

Error Cone



Error Cone

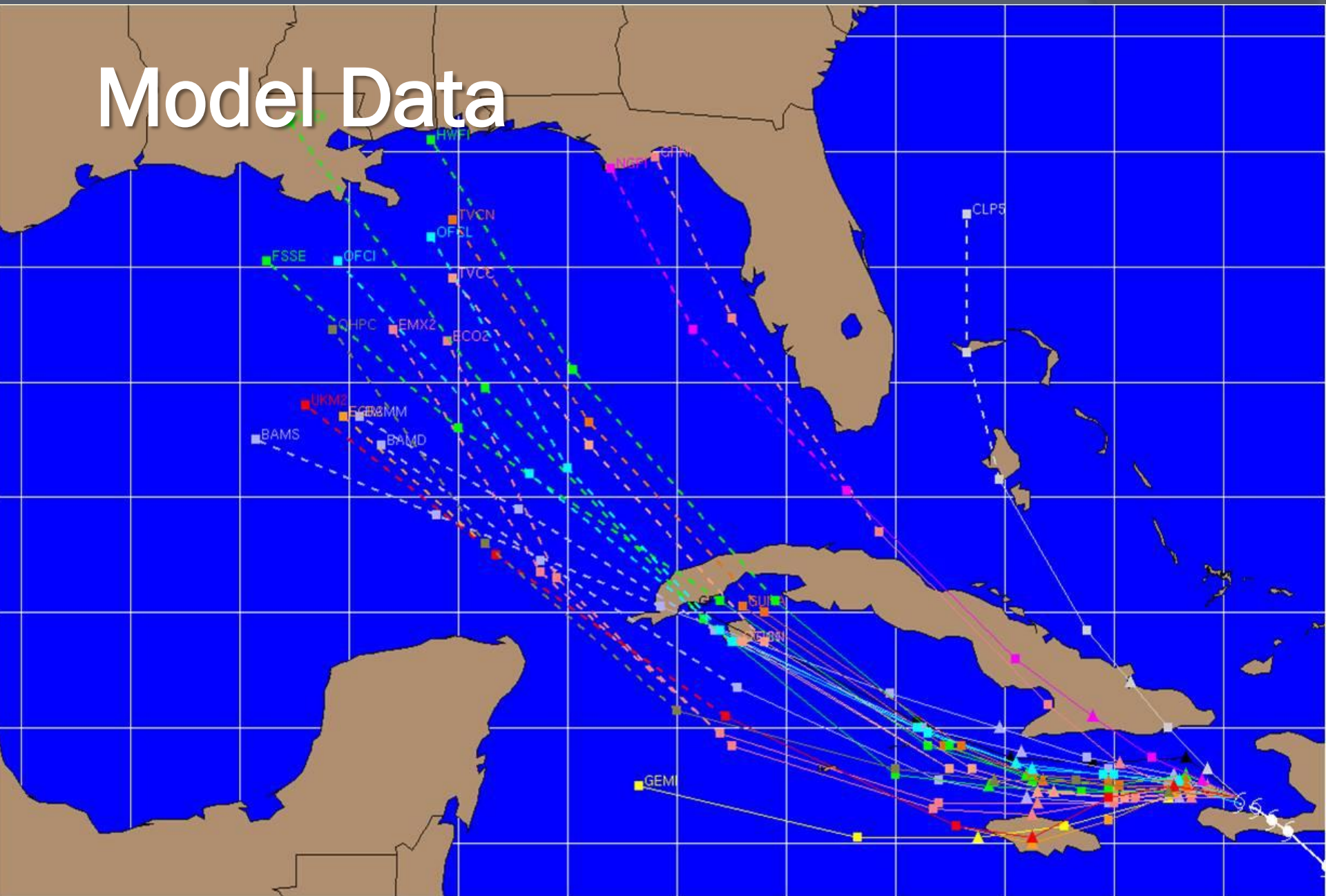
What information being conveyed is important to your decision-making process?



Error Cone

- What is the likelihood that the storm will follow a path outside this cone?
 - 10%
 - “Storm can go where it wants to, but the storm is supposed to be inside the error cone for the first 24hrs.”
 - very likely
 - Remote, but possible ...
 - 1/3 of the time (4)

Model Data



Model Data

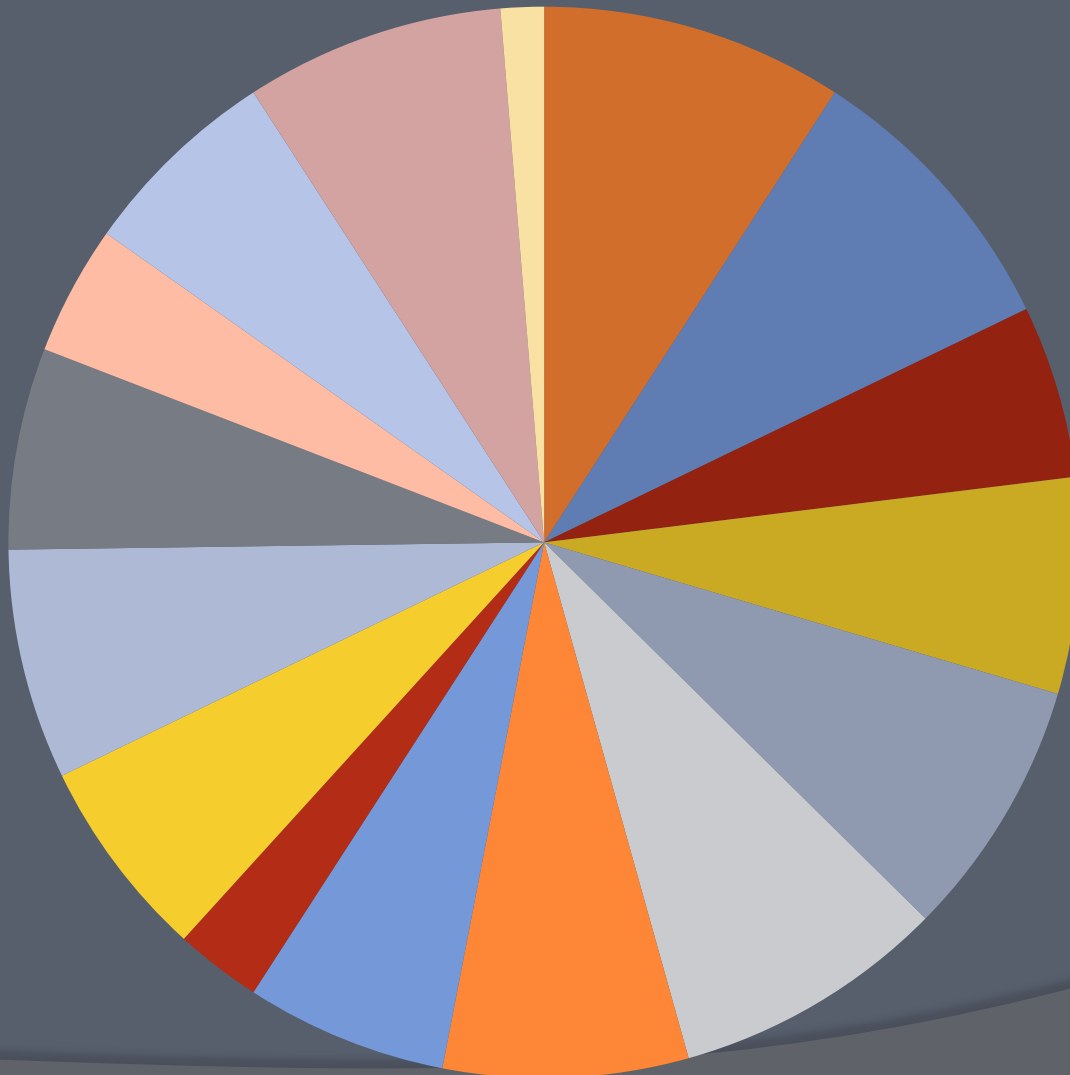
Using this model data please rate your confidence in the following the forecast information:

	Extremely uncertain	More uncertain than normal	Neutral	More confident than normal	Extremely confident
Track of eye	14.3% (3)	9.5% (2)	23.8% (5)	52.4% (11)	0.0% (0)
Intensity of storm	28.6% (6)	14.3% (3)	47.6% (10)	9.5% (2)	0.0% (0)
Timing of landfall	23.8% (5)	4.8% (1)	52.4% (11)	19.0% (4)	0.0% (0)
Local hazards (wind, rain, tornadoes, surge, etc.)	38.1% (8)	9.5% (2)	52.4% (11)	0.0% (0)	0.0% (0)

Model Data

- “I would use this to determine if the models are agreeing or disagree with each other and weigh in other weather factors...”
- “This spaghetti model had pretty good consensus but the spread has to be taken into account. Text would be important to me to understand the forecaster's insight on model accuracy over the course of the history of the system.”
- “Don't use models for any of the above...”

What activities do you use forecast products from the NHC to support?



- Briefing Information
- Evacuation Timing
- Location of Hazards
- Duration of Event
- Location of landfall of eye
- Anticipating neighboring jurisdiction impacts
- Inland impacts
- Resource deployment
- Search and rescue
- Supply needs
- Shelter locations
- Evacuation route planning
- Contraflow decision
- Closure of Services
- Tourist Evacuations
- Other

What activities do you use forecast products from the NHC to support?

- ◎ **“Most of all, to build confidence in our decision making process”**

Thoughts...

- NHC Products are very important and widely used on multiple platforms
- Emergency Managers are diverse group with wide variety of roles, experience
- Within EM community – is there a “super user” group familiar with products, appropriate use?
- EMs appear to tolerate, understand probability – especially when used in conjunction with other NHC products
 - – but does the public? do elected officials?

No matter how accurate, a forecast is valuable only if it is correctly understood and used by an end-user to make a decision and take a necessary action upon it.

(Murphy, 1985)