



Using Seasonal Climate Forecasts to Improve Source-Allocation Decisions by Member Utilities of the Florida Water and Climate Alliance

Chris Martinez, University of Florida

Tirusew Asefa, Tampa Bay Water

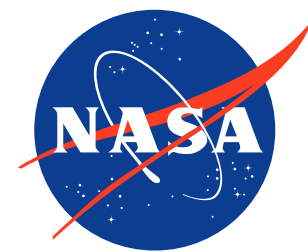
Traci Irani, University of Florida

Jasmeet Judge, University of Florida

Kevin Morris, Peace River Manasota Regional Water Supply Authority

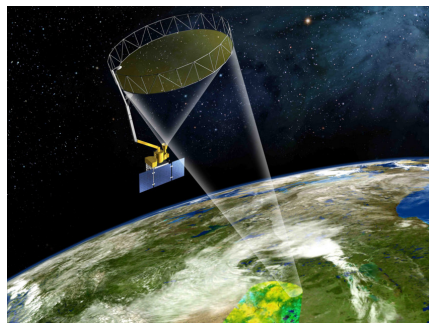
Lisette Staal, University of Florida



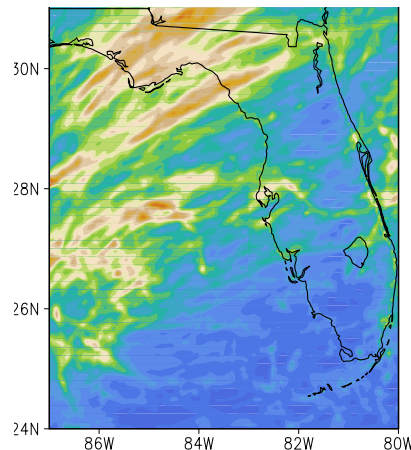


Project Overview

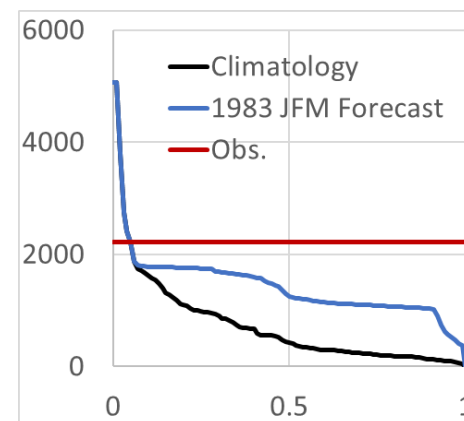
Remotely Sensed Soil Moisture, LAI



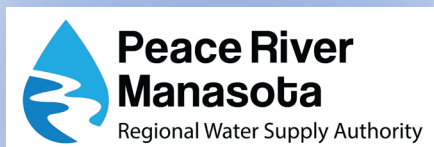
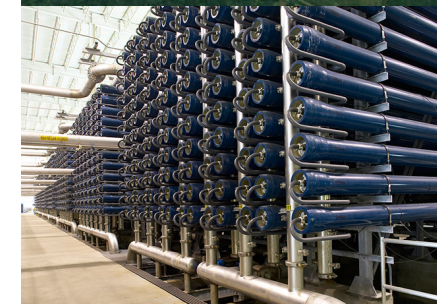
Regional Seasonal Climate Forecasts



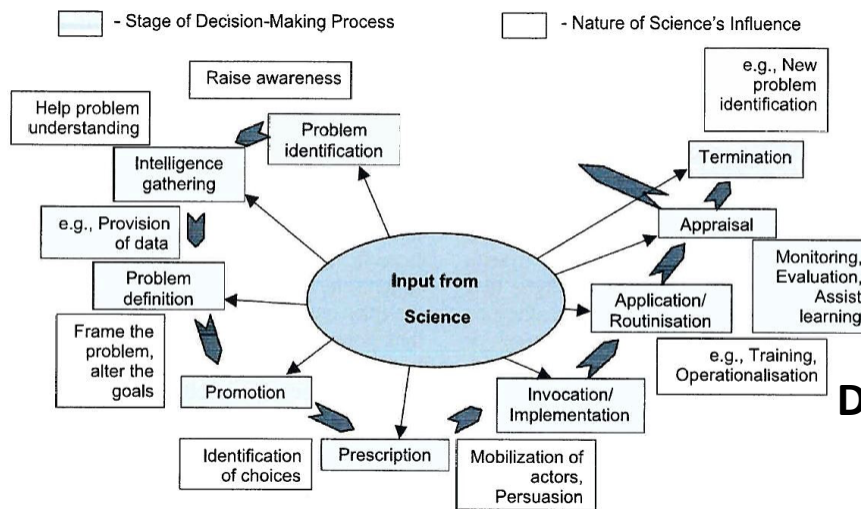
Seasonal Hydrologic Forecasts



Source Allocation



www.FloridaWCA.org



Decision Making Process

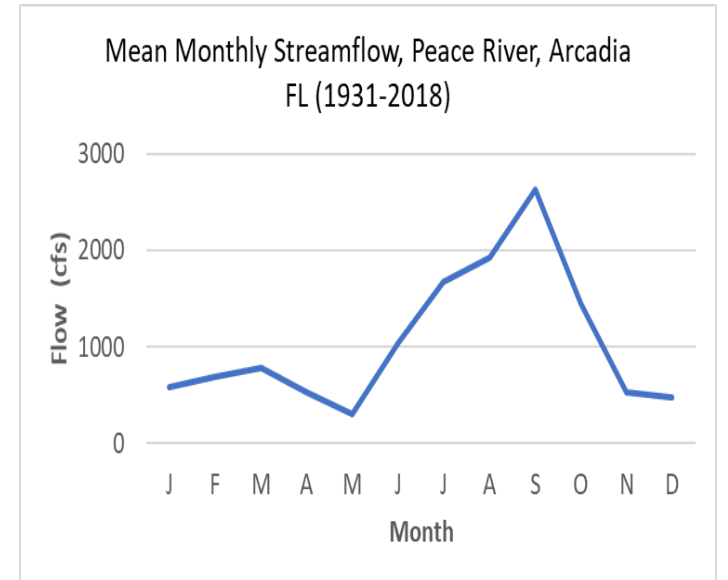
Background: The Florida Water and Climate Alliance (FloridaWCA)

- Partnership of:
 - Water utilities
 - State agencies
 - Researchers
 - Local governments
- Formed in 2010
- 21 workshops
- **Goal**: Increase usability and adoption of climate information

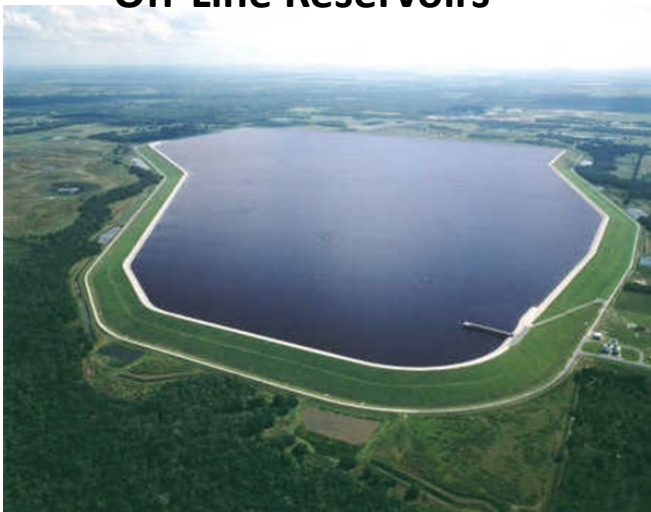


Motivation

- Florida has distinct wet and dry seasons
- Low capacity for “cheap” storage
- Utilities are now using multiple water sources
- **How to use the right source at the right time?**



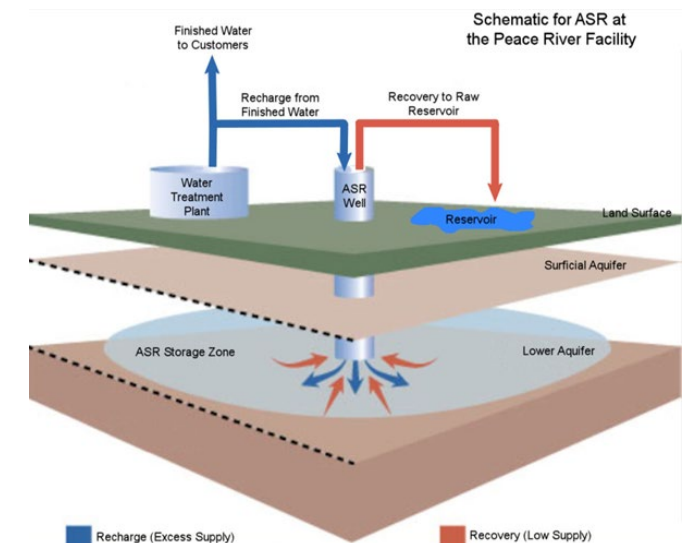
Off-Line Reservoirs



Desalination



Aquifer Storage and Recovery





Tampa Bay Water

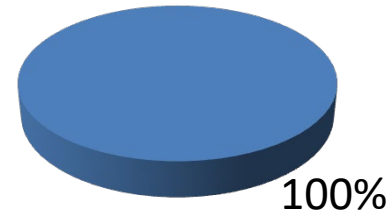
- Current sources:
 - Groundwater (13 Wellfields)
 - Hillsborough and Alafia Rivers
 - C.W. Bill Young Reservoir
 - Desalination Plant



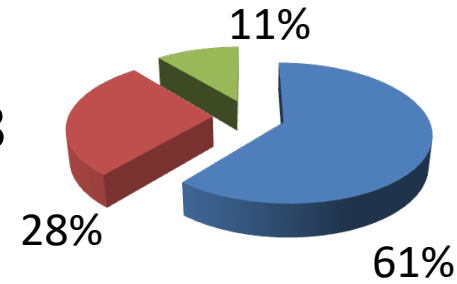
Groundwater Permit

pre 1998	192 MGD	(12-month moving average)
1998	158 MGD	
2002	121 MGD	
2008	90 MGD	

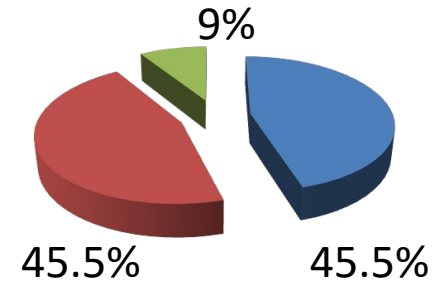
1998



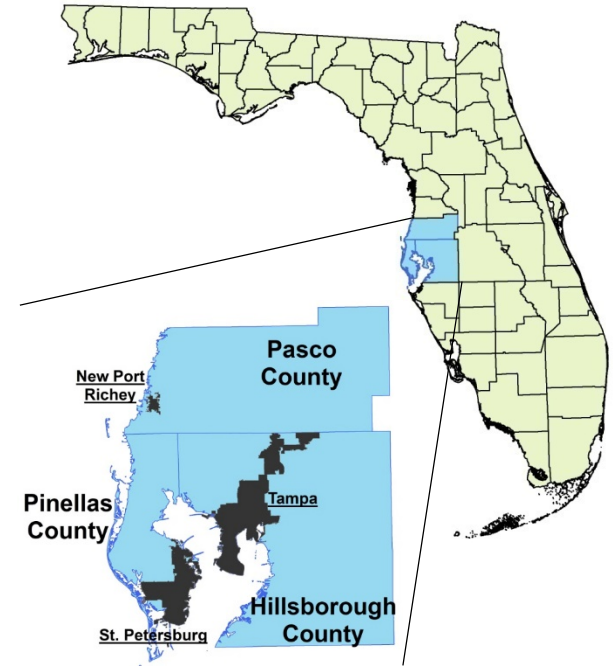
2008



2012



- Groundwater
- Surface Water
- Desalination

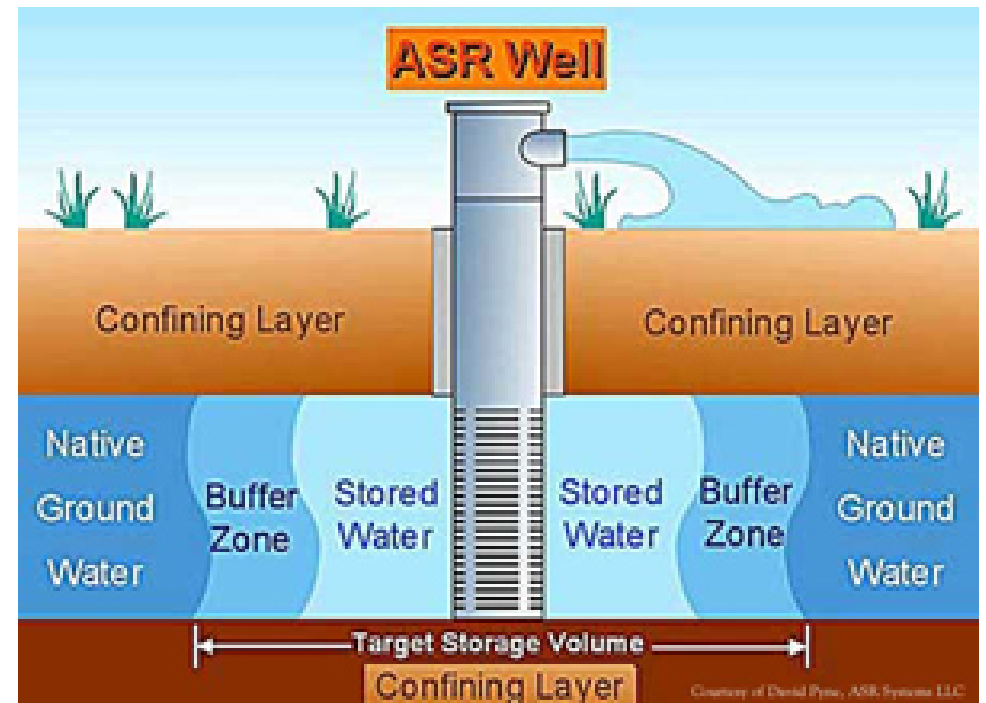
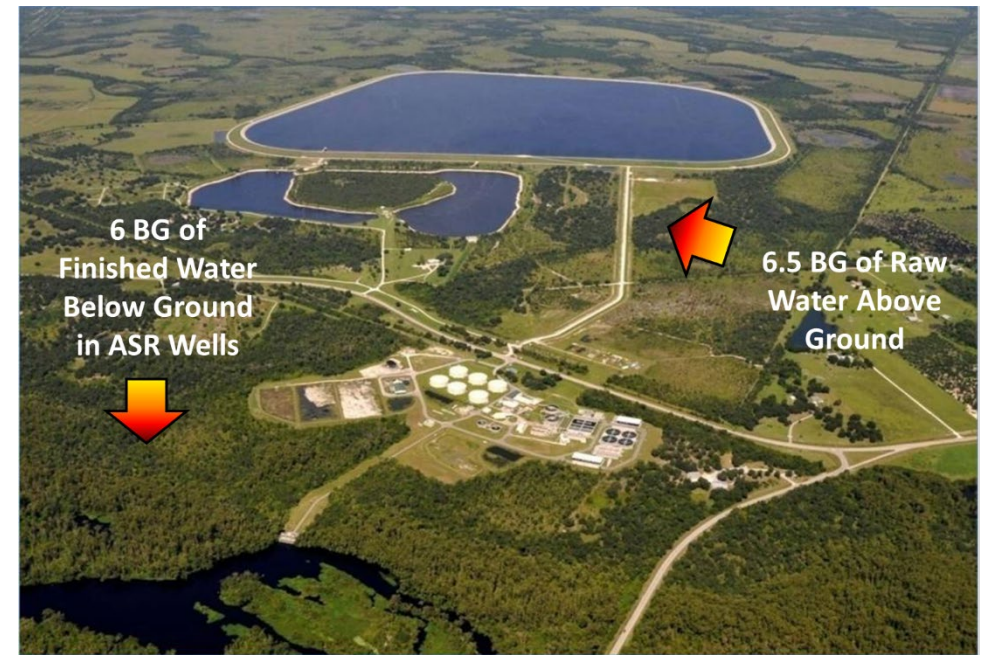




Peace River

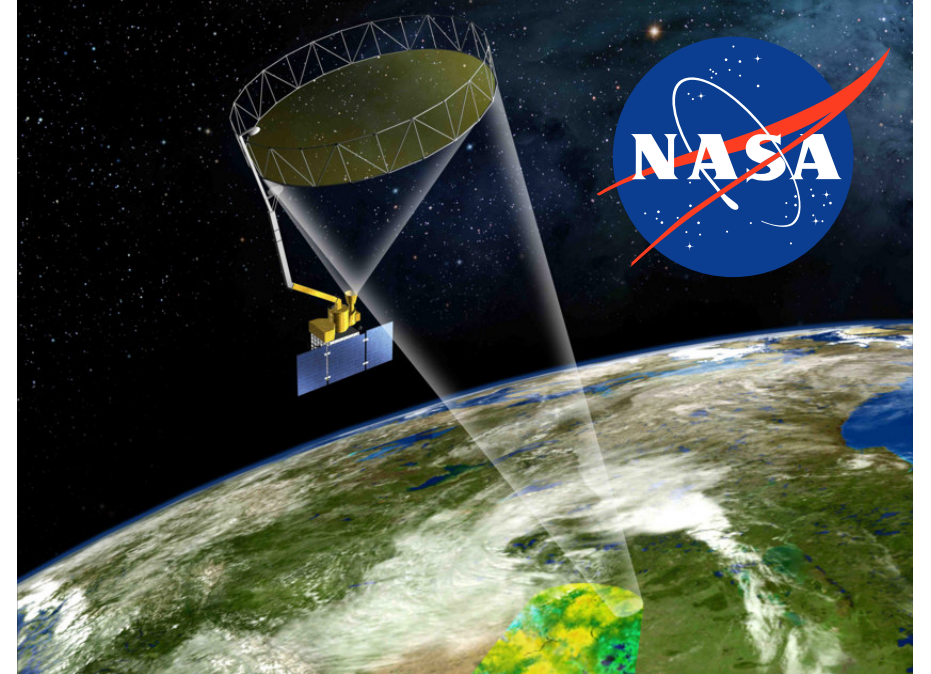


- Peace River is their only source
 - Reservoir
 - Largest Aquifer Storage and Recovery (ASR) system East of the Mississippi
- When to start recovery?
 - Too soon: costs go up (treated twice), higher TDS
 - Too late: less reservoir water to dilute TDS, saltwater upconing?



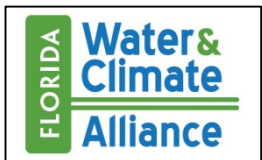
Forecast Initial Conditions

- Soil Moisture Ocean Salinity (SMOS)
- Soil Moisture Active Passive (SMAP)
- Moderate Resolution Imaging Spectroradiometer (MODIS)
- 10 km resolution



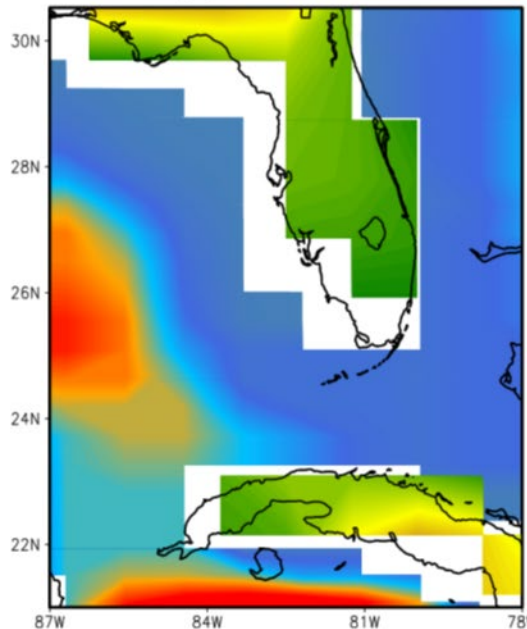
High Resolution Forecasts

- Low resolution models **do not capture** land-ocean interaction
- **Single value** at each grid cell for:
 - Soil moisture
 - Land surface



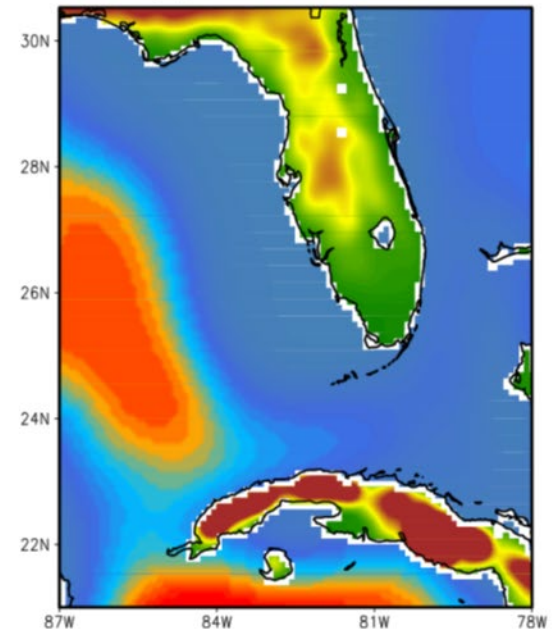
Current ~ 100 km

(a) CCSM4



This Project ~ 10 km

(b) RSM-ROMS

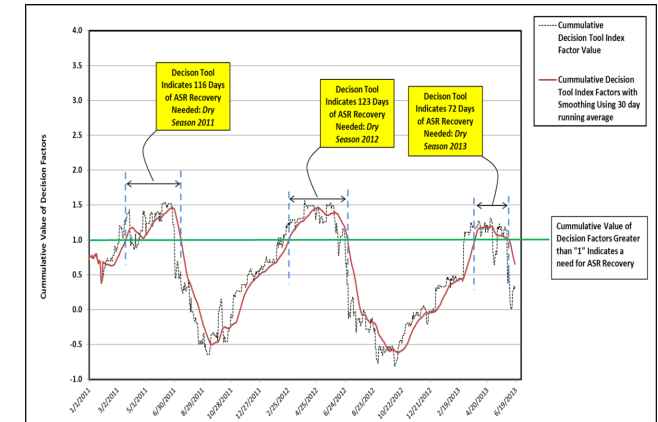


Integration into Operations

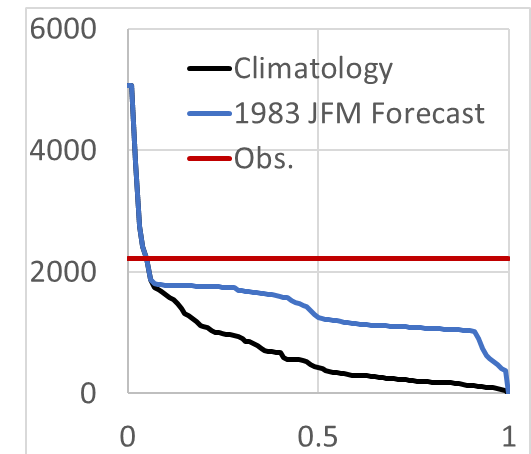
- Tampa Bay's Seasonal Rainfall-Runoff Model
 - Currently conditioned on ENSO/CPC Outlooks
- Peace River ASR Initiation Index
 - Currently uses CPC Outlooks and Observed Streamflow
- UF Probability of Exceedance Streamflow Models
 - Currently use Observed Climate

The screenshot shows an Excel spreadsheet with columns for: Raw Water Reserves, Month of the Year, ASR Reserves, Keetch Byram Drought Index for Watershed, USGS River Flow at Arcadia, Climate Prediction Center 3 Month Precipitation Outlook, Climate Prediction Center 3 Month Temperature Outlook, Climate Prediction Center 3 Month Precipitation Outlook, Climate Prediction Center 3 Month Temperature Outlook, Demands based on Running Annual Average, Cumulative Decision Tool Index Factors, and Smoothing Using 30-day running average.

ASR Initiation Index

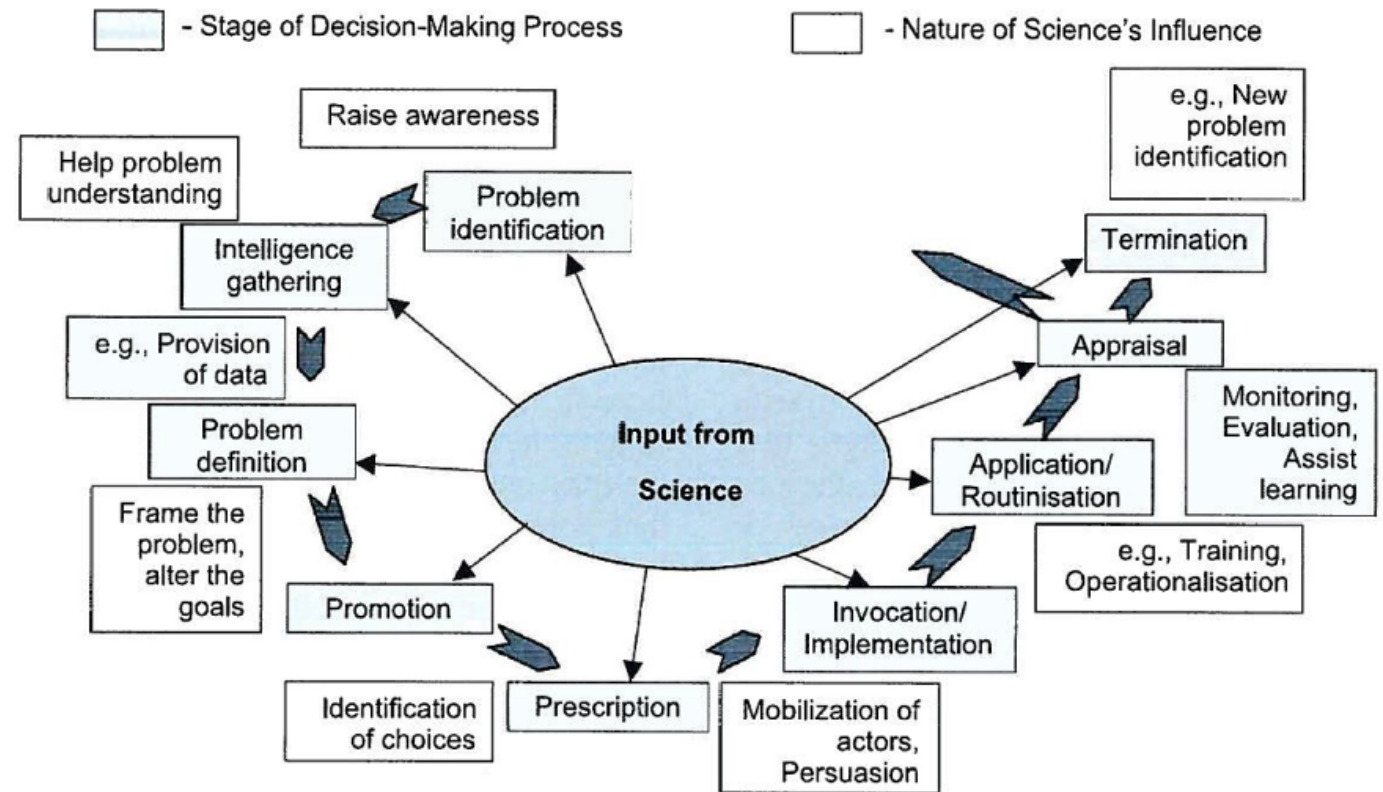


Seasonal Probability of Exceedance Forecasts



Assessment of the Process, Implementation and Effectiveness of Integration into Decision-Making

- Where and how does scientific input have an impact on adoption?
- Don't "Build it First"
- What are the impacts of our champions?



Scientific input at stages of the decision-making process (Vogel et al 2007)

Questions?

2010



2019



Florida Water and Climate Alliance

www.FloridaWCA.org



chrisjm@ufl.edu