

CHNEP Climate Change Indicators Survey Results

Candidate Indicators	CCMP Problem	Median of 18 Respondants	Average of 18 Respondants
Loss of wetlands attributed to retreating shorelines.	FW	4	3.9
Changes to precipitation trend/patterns	HA	4	3.7
Loss of Conservation Acreage due to sea level rise	FW	4	3.7
Water temperature	WQ	4	3.7
Habitat loss/degradation - salt marshes	FW	4	3.6
Migration/depletion of seagrass beds.	FW	4	3.6
Saltwater Marsh Acreage and Location.	FW	4	3.5
Mangrove Acreage and Location.	FW	4	3.5
Conversion of wetlands to open water.	FW	4	3.4
Drought caused by increased atmospheric temperatures.	HA	4	3.4
Relative sea-level rise	SG	4	3.4
Extreme precipitation	HA	4	3.3
Coastal erosion rates.	HA	4	3.3
Flooding at coastlines.	HA	4	3.2
Habitat loss/degradation - seagrasses	FW	3.5	3.5
Habitat loss/degradation - coastal strand	FW	3.5	3.4
Habitat loss/degradation - mud flats and sandbars	FW	3.5	3.4
Migration of low marsh into high marsh.	FW	3	3.4
Drought intensity	HA	3	3.4
Sea surface temperature Trends	WQ	3	3.3
Timing of seasonal activities (migration, hatching, production)	FW	3	3.3
Drought frequency	HA	3	3.3
Geomorphic changes at the coastline.	SG	3	3.3
Habitat loss/degradation - creek wetlands	FW	3	3.2
Die-offs of sponges, sea urchins, sea grasses (non-mobile) attributed to Increased sea surface temp	FW	3	3.2
Timing of seasonal temperature changes.	SG	3	3.2
Salinity Trends	WQ	3	3.2
Condition of mangrove shoreline.	FW	3	3.2
Ecosystems ranges in the state.	FW	3	3.1
Habitat loss/degradation - oyster bars	FW	3	3.1
Flows, summer	HA	3	3.1
Flows, winter	HA	3	3.1
Maximum temperatures.	SG	3	3.1
Storm frequency and intensity.	SG	3	3.1
Dissolved Oxygen Trends	WQ	3	3.1
Ecologic changes at the coastline.	FW	3	3.1
Amphibian populations' ranges, health, and phenology.	FW	3	3.1
Benthic Macro-invertebrate abundance and diversity.	FW	3	3.1
Habitat loss/degradation - coral ecosystems	FW	3	3.1
Land loss due to coastal erosion	FW	3	3.1
Drought causing lower stream flows	HA	3	3.1
Atmospheric carbon dioxide.	SG	3	3.1
Hurricane intensity.	SG	3	3.1
Sea level rise resulting from increased temperature and expansion of water volume.	SG	3	3.1
Faunal range shifts.	FW	3	3.1
Air temperature trends	SG	3	3.1
Storm surges levels.	SG	3	3.1
Timing of seasonal hydrologic changes.	HA	3	3.1
Hydrologic changes at the coastline.	SG	3	3.1
Seagrass fall % cover by species, deep edge.	FW	3	3.0
Threatened/endangered species	FW	3	3.0
Changes in rainfall patterns and amounts change agricultural yields.	SG	3	3.0
Sea surface temperatures affect coastlines.	SG	3	3.0
Storm/cyclone frequency	SG	3	3.0
Storm/cyclone intensity	SG	3	3.0
Urban changes due to sea level rise and coastal flooding.	SG	3	3.0
Water depth	WQ	3	3.0
Water table level	HA	3	2.9
Coral bleaching and death of corals.	FW	3	2.9
Wildfires resulting from increased atmospheric temperatures (combined with increased drought)	SG	3	2.9
Habitat loss/degradation - macro-algal beds	FW	3	2.9
Seagrass acreage by seagrass segment	FW	3	2.9
Salinity	HA	3	2.9

Candidate Indicators	CCMP Problem	Median of 18 Respondants	Average of 18 Respondants
Ecosystem services changes due to estuarine water quality.	SG	3	2.9
High tide levels.	SG	3	2.9
Sea level rise resulting from the melting arctic ice sheet.	SG	3	2.9
Chlorophyll-aTrends	WQ	3	2.9
Stratification	WQ	3	2.9
Shift in bird behavior phenology.	FW	3	2.9
Amount of time freshwater flows are within natural seasonal variation for Caloosahatchee R	HA	3	2.9
Amount of time that freshwater flows are within the natural seasonal variation for Estero Tributaries	HA	3	2.9
Amount of time freshwater flows are within natural seasonal variation for Myakka R	HA	3	2.9
Amount of time freshwater flows are within natural seasonal variation for Peace R	HA	3	2.9
Greenhouse Gas (GHG) Emmission	SG	3	2.9
Freshwater Wetland Acreage and Location.	FW	3	2.9
Flooding throughout the watershed.	HA	3	2.9
Percent rainfall delivered in rainy season	HA	3	2.9
Hurricane wind speeds.	SG	3	2.9
Bay hypoxia.	WQ	3	2.9
HAB-red tides Trends	WQ	3	2.9
Benthic community diversity	FW	3	2.8
Marine thermal stratification.	SG	3	2.8
HAB-blue-green algae Trends	WQ	3	2.8
HAB-macro-algae & filamentous green algae Trends	WQ	3	2.8
Presence of cold/warm water species	FW	3	2.8
Reproduction measures	FW	3	2.8
Wetland ecosystem services.	FW	3	2.8
Range of marine species	FW	3	2.8
Economic changes due to climate change.	SG	3	2.7
Physical stress of sea level rise on infrastructure.	SG	3	2.7
Habitat loss/degradation - xeric oak scrub	FW	3	2.7
Invasive species ranges.	FW	3	2.7
Native Upland Acreage and Location.	FW	3	2.7
Presence of low-flow/high-flow sensitive species	FW	3	2.7
Winter lake temperatures	FW	3	2.7
Ability of barrier islands to shield coastal areas from higher storm surges.	SG	3	2.7
Basin average interpolated monthly rainfall	WQ	3	2.7
Colored Dissolved Organic Matter (CDOM) Trends	WQ	3	2.7
pH of estuarine waters.	WQ	3	2.7
pH of marine waters.	WQ	3	2.7
Shellfish harvest area closures	WQ	3	2.7
Freshwater Wetland Species Composition for Sample Sites	FW	3	2.6
Habitat loss/degradation - pine flatwoods	FW	3	2.6
Mangrove Species Composition for Sample Sites	FW	3	2.6
Numbers and altered ranges of jellyfish.	FW	3	2.6
Oyster Bay Acreage and Location.	FW	3	2.6
Physical stress of temperature on infrastructure.	SG	3	2.6
Precipitation delivered in heavy and extreme events.	SG	3	2.6
Biochemical Oxygen Demand Trends	WQ	3	2.6
Turbidity Trends	WQ	3	2.6
Amount of protected/restored land	FW	3	2.6
Isohaline locations in 3 rivers.	HA	3	2.6
Disease levels due to climate changes.	SG	3	2.6
Value of urban development at risk for damage a storm can inflict.	SG	3	2.6
Monthly median river discharge	WQ	3	2.6
Insect Community Composition	FW	3	2.6
Submerged and intertidal Unvegetated Habitat extent.	FW	3	2.6
Secchi disk depth Trends	WQ	3	2.5
Total Dissolved Solids Trends	WQ	3	2.5
Fish Community Composition	FW	3	2.5
Dissolved Organic Carbon Trends	WQ	3	2.5
Wind speed and direction	SG	3	2.5
Fecal coliform bacteria Trends	WQ	3	2.5
Specific conductance Trends	WQ	3	2.5
Phenology of pest and beneficial insects.	FW	3	2.4
Enterococci bacteria Trends	WQ	3	2.4
Ground subsidence.	HA	3	2.4
Community diversity	FW	2.5	2.7
Changes to phenology of anadromous fishes.	FW	2.5	2.6
pH of freshwaters.	WQ	2.5	2.6

Candidate Indicators	CCMP Problem	Median of 18 Respondants	Average of 18 Respondants
Ozone levels	SG	2.5	2.6
Sediment transportation/deposition.	SG	2.5	2.6
Air temperature changes affecting animal health.	FW	2.5	2.5
Invasive species	FW	2.5	2.5
Invasive species presence (diversity of species).	FW	2.5	2.5
Nutrients - Organic nitrogen Trends	WQ	2.5	2.5
Nutrients - total ammonia nitrogen Trends	WQ	2.5	2.5
Nutrients - Total nitrate + nitrite nitrogen Trends	WQ	2.5	2.5
Nutrients - Total nitrogen Trends	WQ	2.5	2.5
Nutrients - Unionized Ammonia Trends	WQ	2.5	2.5
PAR (light attenuation, k) Trends	WQ	2.5	2.5
Parasitism levels due to climate changes.	SG	2.5	2.4
Confidence in risk models.	SG	2.5	2.1
Air Temperature at Bartow, Arcadia, Fort Myers	SG	2	2.6
Invasive exotic plant acreage by Basin on public and submerged lands.	FW	2	2.5
Total organic carbon Trends	WQ	2	2.5
Soil temperatures	SG	2	2.5
Nutrients - Total phosphorous Trends	WQ	2	2.5
Nutrients (nitrogen, phosphorous) Trends	WQ	2	2.5
Soil subsidence rates.	SG	2	2.4
Percentage hot days.	SG	2	2.4
Water clarity	WQ	2	2.4
Humidity trends.	SG	2	2.4
Total coliform bacteria Trends	WQ	2	2.4
Exotic Nuisance Animal Reports by Basin on public and submerged lands.	FW	2	2.3
Kilometers of 1st and 2nd order streams	FW	2	2.3
Chlorides Trends	WQ	2	2.3
Number of high pulses	WQ	2	2.3
Soil moisture availability Trends	WQ	2	2.3
Sulfides Trends	WQ	2	2.3
Water color	WQ	2	2.3
Wave height	HA	2	2.3
Area tourist economy.	SG	2	2.3
Mean duration of high pulses	WQ	2	2.3
Sediment toxicity Trends	WQ	2	2.2
Moth phenology shifted to earlier date.	FW	2	2.1
Iron Trends	WQ	2	2.1
Lead Trends	WQ	2	2.1
Sediment contaminants Trends	WQ	2	2.1
Rate of smog formation.	SG	2	2.1
Copper Trends	WQ	2	2.0
USGS Coastal Vulnerability Index (CVI) (see http://woodshole.er.usgs.gov/project-pages/cvi/ .)	SG	2	1.9



CHNEP Working Group to Review Climate Change Indicators Tele-Conference

Friday January 8, 2010

1:30 – 3:30 pm

Dial-In to CHNEP

Dial-In Number: (888) 808-6959

Conference Code: 3382550

You do not need to let us know if you intend on participating in this tele-conference. If you have questions, please contact Judy Ott 866/835-5785, ext 230 or jott@swfrpc.org.

Purpose, Agenda, Tasks and Background

Purpose of the CHNEP Climate Change Indicators Working Group: CHNEP and EPA are working together to identify 3-5 climate change indicators and corresponding monitoring plan alternatives for the CHNEP. The purpose of the Climate Change Indicators Working Group is to review the results of the previous CHNEP Climate Change Indicators Survey, agree on the short list of indicators and develop monitoring plan alternatives for each indicator.

Agenda (1:30 pm – 3:30 pm):

- **Introductions** - Climate Change Indicators Working Group Participants
- **Review Purpose of EPA/CHNEP Climate Change Indicators Study and CHNEP Climate Change Indicators Working Group** - Joe Herr/ICF International and Lisa Beever/CHNEP
- **Review and Discuss Results of CHNEP Climate Change Indicators Survey** - Participants
- **Discuss Data Sources, Quality, Analysis Mechanisms, Gaps and Targets** - Participants
- **Summarize Consensus of Climate Change Indicators and Next Steps** - Lisa Beever/CHNEP and Joe Herr/ICF International
- **Adjourn**

Tasks for Climate Change Indicators Working Group Tele-Conference:

- Narrow list of potential Climate Change Indicators from survey results and group consensus.
- Discuss alternative Climate Change Indicators not included in survey results.
- Identify consistency of each potential Climate Change Indicator with CHNEP CCMP.
- Outline relationships between potential Climate Change Indicators and existing CHNEP Environmental Indicators.
- Identify usefulness of each potential Climate Change Indicator for resource management and public outreach.
- Outline pros and cons of each Climate Change Indicator.
- Identify data sources and quality for each potential Climate Change Indicator.
- Identify existing analysis mechanisms for each potential Climate Change Indicator (e.g. CHNEP Triennial Water Quality Status and Trends Report).
- Identify data gaps for each potential Climate Change Indicator.
- Identify potential targets and/or thresholds for each potential Climate Change Indicator.

Background: The top results of the CHNEP Climate Change Indicators Survey are summarized on the attached tables.

THIS MEETING IS OPEN TO THE PUBLIC

Two or more members of the Peace River Basin Management Advisory Committee, Peace River Basin Management Working Group, or Southwest Florida Regional Planning Council may be in attendance, and may discuss matters that could come before the respective body.



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Climate Change Indicators Tele-Conference**

Friday January 8, 2010

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CHNEP Climate Change Indicators Survey Results that Received Median Values of 3.5:

Climate Change Indicator	Priority Action
Loss of wetlands attributed to retreating shorelines.	FW
Changes to precipitation trend/patterns	HA
Loss of Conservation Acreage due to sea level rise	FW
Water temperature	WQ
Habitat loss/degradation - salt marshes	FW
Migration/depletion of seagrass beds.	FW
Habitat loss/degradation - seagrasses	FW
Saltwater Marsh Acreage and Location.	FW
Mangrove Acreage and Location.	FW
Conversion of wetlands to open water.	FW
Drought caused by increased atmospheric temperatures.	HA
Habitat loss/degradation - coastal strand	FW
Habitat loss/degradation - mud flats and sandbars	FW
Coastal erosion rates.	HA
Relative sea-level rise	SG
Drought intensity	HA
Timing of seasonal activities (migration, hatching, production)	FW
Extreme precipitation	HA
Ecologic changes at the coastline.	FW
Flooding at coastlines.	HA

Additional General Considerations Identified in CHNEP Climate Change Indicator Survey:

- Timing of seasonal activities (migration, hatching, production)
- Loss of Conservation Acreage due to sea level rise
- Ecologic changes at the coastline.
- Habitat loss/degradation/migration (changes) of coastal strand.
- Habitat loss/degradation/migration (changes) of mangroves.
- Habitat loss/degradation/migration (changes) of mud flats/sand bars.
- Habitat loss/degradation/migration (changes) of salt marshes.
- Habitat loss/degradation/migration (changes) of seagrass.
- Habitat loss/degradation/migration (changes) of wetlands from retreating shorelines/conversion to open water.
- Coastal erosion rates.
- Drought intensity.
- Flooding at coastlines.
- Changes to precipitation trend/patterns, including extreme precipitation
- Relative sea-level rise.
- Water temperature.

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