



Aquarium and Aquaculture Facility Emergency Preparedness and Recovery

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Prepare in advance





Develop a Written Plan

- Chain of command, response team, and response procedures for all disasters
- Categories of concerns
- Specific events



Categories of Concern

- Loss of life
- Collection loss
- Utility failure
- Major facility damage
- Computer systems failure
- Loss of animal containment
- Crises communication & reporting structure



Specific Events

- Hurricane
- Tornado
- Earthquake
- Snow/ Ice
- Fire
- Terrorism
- Disease outbreak
- Animal Escape



Specific Events

- Define event
- Establish command center (primary and secondary)
- Reconfirm leadership
- Define specific actions to take



Prepare in advance

- Identify resources
 - Local, federal and other authorities
 - Plumber, electrician, animal care staff, researchers, disease experts
 - Emergency Contact Tree
 - Participate as a member on your local Emergency Management Action Team
 - Coordinate with local Emergency Management Services (EMS)



Prepare in advance

- Obtain life support equipment and supplies
 - Propane heaters
 - Oxygen bottles for fish enclosures
 - Frozen water for chilled exhibits
 - Food on site suitable for 3-4 days
- Maintain equipment
 - Routine testing of generators/ heaters
 - Check flashlights and other battery powered equipment

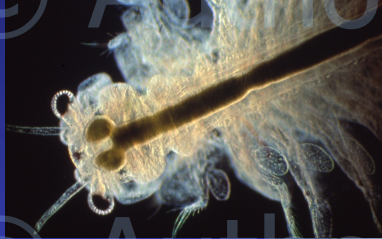


Water Quality Management Plan

- Temperature
- pH
- Salinity
- Hardness
- Alkalinity
- Ammonia, nitrite, nitrate
- Dissolved oxygen



Food Management Plan



Prepare in advance

- Training and drills



Implement Plan



Hurricane Isabel
September 14, 2002



Risks Assessed:

- Power Loss
- Flooding
- Wind damage



Preparations: Power Loss

- Ensure life support in the event of power loss
 - Extra O₂ and regulators, air pumps
 - Dry ice to freezers, frozen salt water buckets
 - 500 W generator serviced – air and lights
 - Aquarium reserved 1500KW tractor-trailer generator



Preparations: Flooding

- Flood gates installed
- Sandbags



1:00 am

- Water level crested over Pier 3, main aquarium building.
- Watertight gates appeared to be holding – some leakage held back with wet-vacs..



2:00 am
(high-tide at 2:30 am)

- Battle to save Pier 3 ground level starts as floodwaters continue to rise.
- All available wet-vacs, sump pumps put in service.
- Harbor water bubbling up through cracks in floor.
- Bags of aquarium gravel and filter sand used to increase height of sandbagged areas.
- Start prep to shut down Pier 3 fish systems if needed.



3:00 am

- Floodgates and sandbags breached.
- Temporary construction wall blows out.
- Electrical room floods. Telecom room floods.
- Shut-down all power to Pier 3.
- Back-up generator providing air blower and emergency lights.



6:30 am

- Pier 3 generator dies – no air, no lights
- Secure air sources to critical Pier 3 exhibits – sequential prioritization
 - 1) expensive, rare, “signature”, sensitive
 - 2) tropical exhibits
 - 3) local exhibits
 - 4) back-up tanks abandoned



8:30 am

- Aquarium CEO arrives in canoe.
- Cell phones are dead, aquarium phones are flooded, pay phone in lobby works.
- No ETA on power. 1500KW generator can't be moved in.



10:30 am

(water levels falling)

- All air supplies brought in to Pier 4 by police boat
- All available O2 bottles ordered from local supplier.



12:30 pm

- Small generator restarted – air blowers and emergency lights operational.
- Still no LSS, chillers, HVAC, phones, etc.



1:00 pm

- Relief husbandry staff arrive.
- Transfer of status, plans, responsibilities.



8:30 – 10:30 pm



- Electricity OK to turn back on
- Restart all fish systems individually
- All sand filters backwashed



No
Animal
Mortalities

Recovery

- \$1,000,000 damage and losses.
- Marathon effort to reopen building to public in 2 days.



Lessons Learned - Staffing:



- Choose response personnel carefully for safety and physical exertion factors.
- Plan relief staff.
- Keep an up-to-date contact list.
- Make arrangements with police for staff to be granted entrance to “disaster” area.

Lessons Learned - Equipment

- Have small portable generators and extra fuel available.
- Have extra oxygen bottles and regulators available at all times.
- Have multiple means of communication



In Conclusion



A solid plan will likely not contain solutions to all emergencies, but it will provide the framework necessary to respond appropriately and minimize the severity of the disaster

Midnight

- Pier 4 power shut down.
- Dolphins without LSS.
- Rigged O2 bottles on 4 fish exhibits.
- Started watching harbor water level rising on Pier 3.

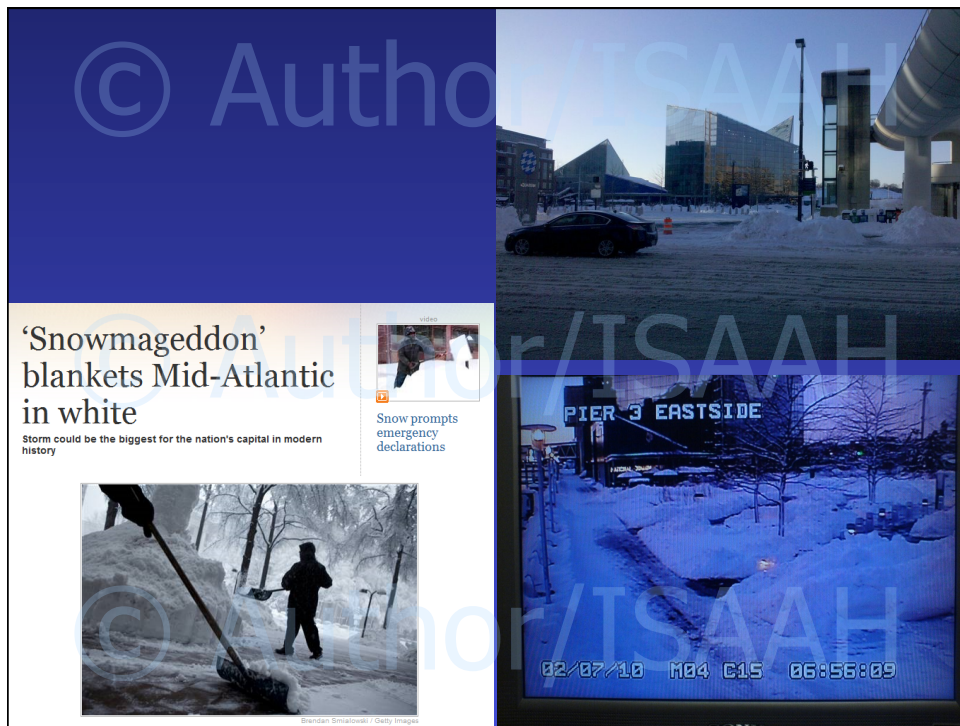


11:30 pm

- Harbor had risen to within 3" of our Marine Mammal Pavilion.
- High tide not expected until 2:30 am.
- Made decision to shut-down power to Pier 4 (Marine Mammal Pavilion).





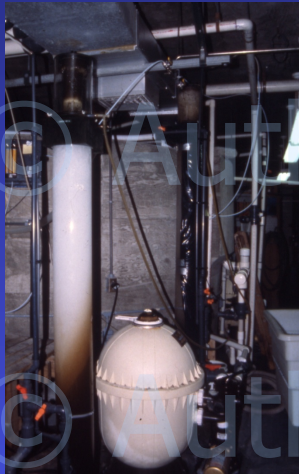
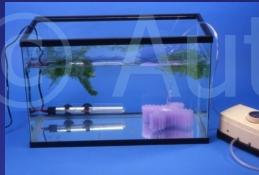




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Filtration

- Mechanical
- Biological
- Chemical



Develop a Plan

- Leadership-
 - Chain of command
 - Disaster Response Team
- Roles and responsibilities (Duties)
- Determine primary and secondary sites for Command Center



Prepare, Implement, and Recover

