

Climate Change and the Apostle Islands

A PARK PERSPECTIVE

By **Bob Krumenaker**
Apostle Islands

Melting ice sheets, rising sea levels, more intense hurricanes, endangered polar bears. Do these popular images of global warming have anything to do with the Great Lakes or any national park in the middle of the country?

Perhaps the images don't, but the issue of climate change certainly does. In fact, it could be the most important issue we will face at the Apostle Islands National Lakeshore in the coming decades.

You may have noted that I quickly went from "global warming" to "climate change." According to the National Academy of Sciences, climate change is the more accurate term, as the rise of average global temperatures has cascading effects on precipitation, winds, storminess and other climate factors.

There really seems to be little debate any longer amongst reputable scientists that climate change is already occurring, and it will accelerate in the next decades regardless of whether or not we, as a global society, limit our greenhouse gas emissions. The conversation is

shifting to the impacts of climate change and the need for adaptation. For Lake Superior and the Apostle Islands, like everywhere else, how these changes will ripple through the ecosystem and human society will be far more important than whether it will be warmer or colder, wetter or drier.

The climate-driven changes to the ecosystem translate to changes to the park experience, with implications for the park's future. We are already seeing some of these effects, however, and therefore this is no longer a theoretical discussion but an issue for today.

Climate Change Will Affect Apostle Islands Resources and Visitors

| Predicted Climate Change | Predicted Direct Effects | Probable Indirect Physical & Biological Effects | Probable Indirect Effects on the Park Experience |
|--|--|---|---|
| Warmer summers | Less winter ice | Habitats will shrink or disappear for species at the edges of their ranges (which includes almost all of the unique species on Great Lakes islands) | Longer summer season |
| Warmer winters, with more precipitation falling as rain rather than snow | Increase in evaporation | Increases in invasive insects and diseases | Shorter winter recreation season |
| Later freeze-up and earlier ice breakup and snow melt | Lower lake levels | Changes in phenology, potentially disconnecting some critical ecological interactions | Infrastructure problems: fixed docks will be too high and water may be too shallow to allow access to some docks |
| Irregular, high intensity storm events | Ephemeral wetlands, hugely important biological areas, will dry up. Some current wet areas will become wetlands. | Cold water fish habitat will shrink, warm water habitat will increase | Navigation hazards exposed |
| | Warmer water extending lower in the water column will affect lake turnover and nutrient cycling, and potentially lead to permanent lake stratification | More algae | Recreational fishing quality will change |
| | | More turbidity | Degradation of submerged cultural resources (lake is no longer cold and relatively sterile) |
| | | Rain-on-snow events will cause more winter and spring flooding | People will bring more boats not suited for cold Lake Superior conditions; likely higher percentage of inexperienced boaters who may not have skills to handle storm events |
| | | Forest fires will grow in frequency, size and intensity | Visitor safety issues increase; more rescues |

Some of these things are already happening, and not simply due to the drought of the last few years. There are documented increases in air and lake temperature and reductions in ice cover locally, and evidence that spring events are happening earlier regionally. While it may be only the result of the current drought, what we have seen here the last two years seems to be a harbinger of things to come: hotter, drier summers; warmer winters; less ice; warmer water; lower lake levels; rapidly increasing range of exotic insects such as gypsy moths, resulting in unprecedented defoliation of island forests.

More generally, climate change makes ecosystems, including the Apostle Islands, more vulnerable to other stressors and far less resilient to additional disturbances. Changes in Lake Superior will also affect the economy and quality of life of the park's gateway communities. Many people live and vacation here because they love what the lake offers *today*. Will it still offer the same amenities 50 or 100 years hence?

I sometimes say that national parks are "in the perpetuity business." We're here for the long haul. The NPS mission, established by Congress in 1916, is "to conserve the scenery and the natural and historic objects and the wild life therein and to provide for the enjoyment of the same in such manner and by such means as will leave them *unimpaired for the enjoyment of future generations*."

The challenge is that we don't know what "unimpaired" should mean under the expected climate change scenario.

We need to identify under what circumstances we should resist changing nature (regardless of cause) and when we should acquiesce, however reluctantly, to the changes. Creating refuges for vulnerable species somewhere else, where the climate is expected to remain (or become) favorable, sounds like a great idea when it's *our* species and the place is elsewhere. It may not sound so attractive if the Apostle Islands would be proposed to become the new home of a species from hundreds of miles south. Is there a



Apostle Islands

NPS operations center at Roys Point marina on the mainland, Apostle Islands, January 2007. Doug Pratt, team supervisor for historic structures and utilities, measures the height of the dock above the lake surface. Note the open water and mild temperatures in January, which is highly unusual. January 2007 was the warmest ever recorded regionally and globally.

difference between a transplanted species and a new invasive species?

I have more questions than answers at this point, and I'm glad that discussions are beginning within the agency, and at all levels, as well as in the park's gateway communities. In the meantime, we are taking some tangible steps at Apostle Islands:

1. We have increased our commitment to sustainability across the board, and are active participants in community sustainability efforts, which fortunately are very strong in our area.
2. We're identifying our own contribution to greenhouse gas emissions and working to reduce them. Community members will be invited to participate in a summer workshop to broaden the discussion to those most affected by the changing lake.
3. We will be stating our assumptions about the changing environmental conditions in our general management plan and making sure that all alternatives consider those conditions.
4. We're increasing our educational efforts on climate change and its local effects (including two programs in the summer guest lecture series), presenting peer-

reviewed science in a manner that will be accessible to non-scientists.

5. This summer, in response to near-record low lake levels, we are modifying some docks and taking other short-term mitigation steps, while we consider what, if any, infrastructure changes are appropriate for the long term. It's an acute situation now but it's likely low water will become the norm and we most likely will not be able to, or even want to, modify docks or dredge everywhere it's needed if the lake continues to drop.

Climate scientists predict a slight lessening of the current drought conditions for this summer but record low lake levels remain a distinct possibility. The low lake will be a challenge to both visitors and the park staff but will afford us the opportunity to reflect on what the future of the Apostle Islands may look like.

Long-term changes in the environment seem to be underway now, and we need to begin rethinking what kind of experience and what facilities the park provides. 🏞️

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