

Evidence essay · Wildlife and ecology

A sea-ice pixel is not a habitat map

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Fictional author and institute · Editorial demonstration, not peer reviewed

ABSTRACT

Sea-ice concentration becomes an ecological question only when connected to the geometry and function of habitat. Two hypothetical cells with the same ice percentage illustrate differences in floe arrangement, connected water, edge, and exposure. The essay then adds seabed depth, prey access, seasonal persistence, and the limits of coarse satellite cells, drawing on NSIDC explanations and USGS polar-bear habitat research. Compatible observation dates matter because drift can rearrange the surface, while an animal's mapped movement can include movement of the ice beneath it. Occupancy is not treated as proof of preference, successful feeding, or fitness. A layered interpretation therefore starts with the measured ice variable, identifies the proposed habitat mechanism, and tests it with appropriate biological evidence rather than decorative map overlays.

Keywords: sea-ice habitat · floe geometry · polar bears · habitat inference · tracking scale

Adapted from the Still North field journal. Original article. A source-based editorial text, not a report of original Still North research. Examples and imagery are illustrative.

A sea-ice map colours two neighbouring cells identically. For a climate summary, that may be exactly right. For an animal seeking a breathing opening, a stable resting platform, or access to prey, the cells may offer very different possibilities. A concentration value describes the proportion of a surface covered by ice. It does not describe every arrangement or ecological function inside that surface.

One percentage, many landscapes

Imagine two invented cells, each 80% ice-covered. In one, a large continuous floe borders a single open-water strip. In the other, many small floes are scattered through connected water. Their concentration is the same. Their edges, connections, exposure, and distances between usable surfaces differ. The percentage alone cannot tell an animal, or an ecologist, which arrangement is present.

This is a question of geometry, not a claim that one arrangement suits all wildlife better. A feature useful for one species or activity may be unsuitable for another. The National Snow and Ice Data Center describes leads, ridges, floes, and polynyas as distinct physical structures with different roles. Converting them all into a single ice percentage necessarily loses information.

A grid cell is also not an aerial photograph at the same scale. NSIDC's explanation of area and extent notes that passive microwave cells can cover tens of kilometres. These sensors provide essential observations through darkness and clouds, but cannot resolve every narrow lead or small habitat feature. Zooming the map makes the pixels larger on screen, not more detailed in the world.

The seabed changes what the same ice means

Habitat depends on what lies beneath the surface as well. Ice over a productive continental shelf and ice over deep basin water are not automatically interchangeable. Prey, depth, distance from land, and the seasonal persistence

of a platform can alter its value. The climate variable and the ecological question occupy overlapping, but different, maps.

The US Geological Survey's polar-bear distribution research examines the characteristics and function of sea-ice habitat, including changes over biologically productive shelf waters in Alaska. It links movement with access to prey and energetic costs. The work illustrates why the presence of ice is necessary context without being a complete measure of habitat quality.

A patch of persistent ice far from useful feeding areas cannot simply be added to a disappearing coastal patch and declared an equal replacement. Equally, seeing a bear in a cell does not prove that the cell supports successful feeding or reproduction. Occupancy, preference, and fitness are related questions, but each requires its own evidence.

Match the time as carefully as the place

A wildlife location and an ice observation also need compatible dates. Drift can rearrange floes between a satellite acquisition and an animal sighting. A monthly concentration average can smooth over a brief opening or an important transition. If the biological question concerns access on a particular day, a seasonal mean may be the wrong explanatory variable.

Tracking introduces another movement: that of the ice beneath the animal. A position change on an Earth-fixed map combines the animal's movement relative to its platform with the platform's drift. Interpreting every kilometre as active travel can misdescribe behaviour. The appropriate analysis depends on the question, the tracking accuracy, and an ice-motion estimate at a compatible scale.

Build a habitat interpretation in layers

Begin with the measured variable: concentration, ice type, thickness, or motion. Add the habitat mechanism being proposed, such as access to prey or availability of a resting platform. Then identify the observations that test that mechanism: behaviour, prey information, body condition, repeated use, or another appropriate outcome. The additional layers must be evidence, not decorative map overlays.

Check which animals and seasons the data represent. A model built from one tracked demographic group does not automatically describe every age and sex. Check positional error, acquisition time, missing ice values, and whether fine-scale features are actually resolved. Our [open-observations](#) page explains why those limitations belong beside the result.

The [wildlife and food-web](#) guide follows habitat through relationships rather than symbols. A sea-ice pixel remains an extraordinarily useful observation. The mistake is not using it for ecology. It is allowing the convenience of one available variable to define everything an animal needs.

References

1. National Snow and Ice Data Center describes leads, ridges, floes, and polynyas (nsidc.org)
2. NSIDC's explanation of area and extent (nsidc.org)
3. US Geological Survey's polar-bear distribution research (usgs.gov)