Vegetation Composition & Structure

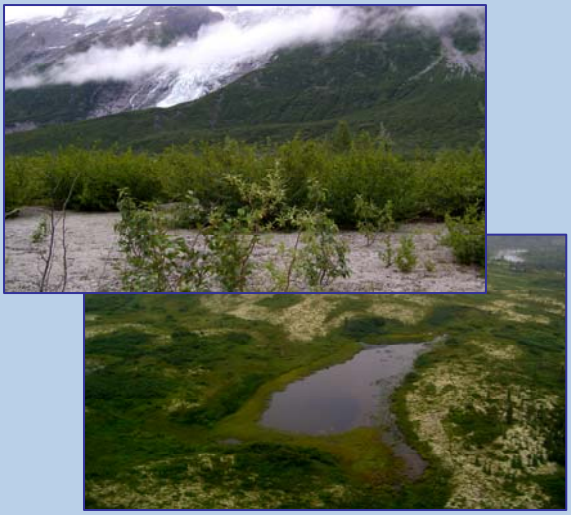
Vital Signs Monitoring- Southwest Alaska Network

Importance / Issues

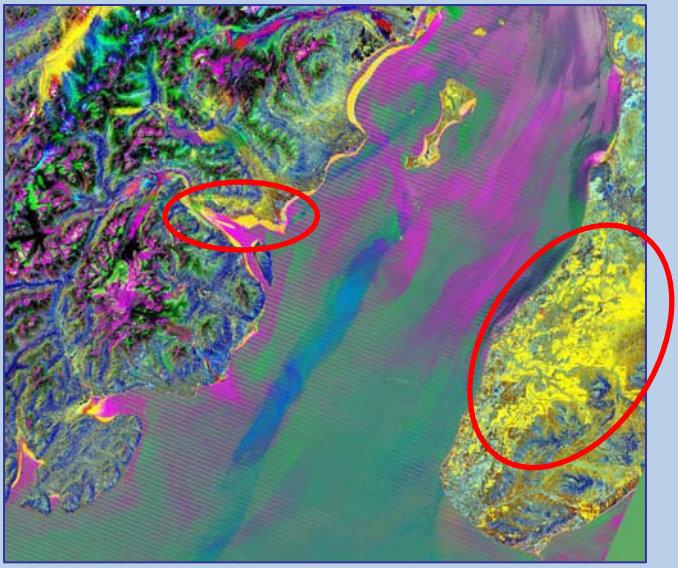
Vegetation composition and structure was identified as a SWAN vital sign because of its importance to ecosystem function. Changes in vegetation affect wildlife habitat, and can also reflect long term trends in climate, biotic interactions, or human uses. For example, a warming climate might accelerate the rate at which trees advance into the subalpine, down the Alaska Peninsula, or into drying wetlands.

Sampling Design and Objectives

In 2006, the SWAN established an Interagency Agreement with the USFS-Pacific Northwest Research Station to adapt an existing protocol developed for the North Coast and Cascades Network (NCCN) for use in the landscapes of the SWAN. SWAN monitoring objectives include detection of changes in shrub cover (e.g., shrub expansion and infilling); changes in coniferous and lichen cover; establishment of vegetation following glacial retreat and/or channel abandonment; and changes in surface hydrology, including infilling of ponds by vegetation and creation of new water bodies. The protocol uses paired Landsat TM/ETM+ images to identify changes through time, using a tasseled-cap transformation to partition out major physiognomic types.



Upper left: alder establishment on glacial outwash, Lake Clark NPP. Lower right: shrub encroachment into lichen-dominated heath and infilling of pond, Katmai NPP.



Landsat difference image showing spruce beetle mortality (yellow areas, circled) in Lake Clark NPP and on the Kenai Peninsula. Image dates: 21 August 1987 and 16 August 2000.

Current and Future Monitoring

Overflights conducted in 2006 showed that existing spectral classes need to be better defined, and that interannual variation in phenology may confound interpretation of change in some parts of the landscape. A draft protocol and SOPs for acquisition, preprocessing, and interpretation of difference images is due in December 2006. Continuing work in 2007 will focus on protocol testing and revision, including the refinement of classes and probabilities of membership. In addition, methods to increase the certainty of the change models will be explored, e.g., by including additional points in the time series (additional TM/ETM+ and/or MSS scenes) and/or by using MODIS as an ancillary data set to separate variation due to phenology from longer-term, directional change.

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