Summary of Extensive Monitoring Programs

Program Design	**Objectives**	**Organization**	**Components Monitored**	**Data Types**	**Study Area (extent & stratification)**	**Scale of Results**
Parks Canada Independent units; Core national	Trends in ecosystem integrity to evaluate management, increasing understanding, ID research needs, provide baseline	National guidance for core indicators; conducted by park staff	Plant and animal diversity, ecosystem functions, stressors	Primarily *in situ*	National parks of Canada	Core indicators at national and bioregional scale; others at park scale
NPS Inventory & Monitoring Independent units	Status & trends of indicators of park ecosystem condition; others similar to Parks Canada	National guidance on administration; network-level authority for monitoring decisions; funded by national agency	Vital Signs – biotic & abiotic ecological components	Variety of types and spatial scales	US NPS units; sampled independently	Primarily park unit
Circumpolar Biodiversity Monitoring Independent units	Coordinating entity for: existing Arctic biodiversity monitoring programs; identifying gaps in knowledge; gathering, integrating, and analyzing data; communicating results	Staff funded by Environment Canada; consists of scientists in all 8 arctic countries; linked to other monitoring programs, who largely conduct the monitoring	Integrated-ecosystem approach (terrestrial, freshwater, marine): spp. composition; ecosystem structure, functions, and services; habitat extent and quality; human health and well-being	Don't do any monitoring themselves, but partners use remote sensing, *in situ* measurements, etc.	Vary by indicator up to all 8 arctic countries defined by Conservation of Arctic Flora & Fauna (CAFF)	Indicator-specific; ranges from individual mgmt units to Arctic-wide
Forest Inventory & Analysis Standard protocol	Assess condition of forests	Funded and conducted by national agency; standard regional protocol	Tree characteristics, physical environment; other vegetation monitoring intensity varies with scale	*In situ* sampling; systematic grid	Forested lands of United States	State, region, national
Kenai NWR LTEMP Standard protocol	Status, trends, distribution of biodiversity	Funded & conducted by Kenai NWR; augments FIA data	Non-vascular plants, insects, birds	*In situ* sampling	Kenai NWR, FIA plots	Refuge
Countryside Inventory Standard protocol;nested	Extent & change of broad habitats; inform policy (esp. land-use)	Conducted by independent public-sector research center; funded by variety of government bodies	Landscape/habitat mapping, vegetation, soil, freshwater, birds	Field mapping, *in situ* sampling, satellite imagery	Great Britain, by land class & nation (England, Scotland, Wales)	National

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3Q Agriculture Monitoring Standard protocol	Changes in agricultural landscapes; inform policy (esp. agricultural)	Conducted by independent research institute; funded primarily by Ministry of Agriculture & Food	Landcover, vascular plants, birds, cultural heritage elements	Aerial photos, selected *in situ* sampling	Norway, agricultural land uses only	National
NARS Standard protocol; nested;	Condition and trend of the Nation's waters; promote collaboration across jurisdictional boundaries in assessment of water quality.	Funded and conducted by national agency, working with states, tribes, and other partners	Water-quality metrics (e.g., indicators of ecological integrity, nutrients, chemical and physical measures, shoreline habitat)	*In situ* samples, automated recorders, supplemented with remotely sensed data	30 U.S. states (Jan. 2008); monitoring divided into coastal, wadeable stream, river, lake, and wetland ecosystems	State, regional (multi-state), and national; some metrics at basin and smaller grains
EMAP	Status of ecological resources	Conducted & funded by national government agency	Surface waters & estuaries; biotic & physical components	*In situ* sampling	United States: projects by region and resource type	Region
EMAN Independent units	Environmental 'early warnings'; inform policy	Various networks of monitoring sites; coordinated by national government agency	Varies by network; includes water, air, temperature, substrate, genetic, species, community & landscape	Primarily in situ sampling	Networks scattered across Canada	Qualitative national summary
Bonanza Creek LTER Reference Site	Improve understanding of long-term consequences of changing climate and disturbance regimes in the Alaskan boreal forest	Funding by federal and university research grants	Biogeochemistry, vegetation, weather, soils, vertebrates, invertebrates	Remote sensing, *in situ* measurements	Varies by study; most in a Research Watershed (10,400 ha) or Experimental Forest (5,053 ha)	Mostly small-scale (plot to within 2 focal units); some across taiga ecosystems or statewide