

Table 3.1.4-1. Summary of indicators and data needs

Resource	Indicators	Existing Data	Data Needed
<p>Water Resources (Water Quantity)</p>	<p>Definition 1: Extent of modification of key hydrological processes (e.g., hydroelectric and storage dams, wetland drainage, channelization, and out-of-stream diversions)</p> <p>Definition 2: Direct benefits from flood control, irrigation, hydropower, municipal/industrial water supply, navigation, and recreation</p>	<p>1. Oregon Water Resources Department (OWRD) database for dam locations and storages, instream water rights, basin sizes, and basin overflows;</p> <p>2. USGS estimated water use and general hydrologic conditions (1990);</p> <p>3. WRD maps for monthly stream flow and water availability;</p> <p>4. Oregon DEQ;</p> <p>5. U.S. Bureau of Reclamation;</p> <p>6. COE</p>	<p>1. Comprehensive, statewide assessment of ground water supplies and sustainable yields;</p> <p>2. Consistent measurement from existing stream flow gauges and expansion of the gauging stations not currently gauged;</p> <p>3. Measurement (instead of estimation) of major water uses including the extent to which instream rights are fulfilled.</p>
<p>Water Resources (Stream and River Water Quality)</p>	<p>Definition 1: Viability of fish or other aquatic species: Low dissolved oxygen, habitat and flow modifications, and high temperature</p> <p>Definition 2: Use as a safe source of drinking water: Presence of fecal coliform, high nitrate concentrations, or presence of contaminants such as pesticides or hazardous wastes</p>	<p>1. Oregon Water Quality Index (OWQI) and DEQ samplings;</p> <p>2. Clean Water Act, Section 303(d)</p> <p>1. Oregon Water Quality Index (OWQI) and DEQ samplings;</p> <p>2. Clean Water Act, Section 303(d)</p>	<p>(See Water Quantity)</p>
<p>Marine Systems</p>	<p>Definition 1:</p> <p>1. Exploited fish and shellfish stocks (stock condition and landings);</p> <p>2. Bottom habitat degradation (trawling areas and intensity);</p> <p>3. Marine mammals (pinniped population trends);</p> <p>4. Kelp forests (location, area, biomass);</p> <p>5. Harmful algal blooms (HABs) and toxic shellfish (recurrence and severity);</p> <p>6. Shoreline armoring (armored miles and rate)</p>	<p>ODFW, 1999;</p> <p>Steve Berkeley, pers. comm., 1999;</p> <p>Hal Weeks, pers. comm., 1999;</p> <p>Waldo Wakefield & Allison Bailey, pers. comm., 1999;</p> <p>Engel and Kvitak, 1998;</p> <p>Friedlander, et al., 1998;</p> <p>Brown, 1997; DSL, 1993;</p> <p>Ecoscan, 1991;</p> <p>Michelle Wood, pers. comm., 1999;</p> <p>Chris Cziesla, pers. comm., 1999;</p> <p>Good, 1994; CNHPWG, 1994</p>	<p>Fisheries: Careful evaluation of the effectiveness of recent management measures over a long period of time.</p> <p>Kelp Forests: (1) Annual aerial and water-based surveys of the location, spatial extent, plant density, and overall biomass of representative kelp forests in southern and central Oregon.</p> <p>(2) Comprehensive descriptions of habitat use of kelp forests by communities of seabirds, shorebirds, marine mammals, fish, and invertebrates.</p>

Resource	Indicators	Existing Data	Data Needed
<p>Marine Systems</p>	<p>Definition 2:</p> <ol style="list-style-type: none"> 1. Exploited fish and shellfish stocks (stock condition and landings); 2. Kelp forests (location, area, biomass); 3. Marine protected areas (number and area) 4. Harmful algal blooms (HABs) and toxic shellfish (recurrence and severity); 5. Shoreline armoring (armored miles and rate) 	<p>ODFW, 1999; Steve Berkeley, pers. comm., 1999; Hal Weeks, pers. comm., 1999; DSL, 1993; Ecoscan, 1991; ODFW, 1998; O'Keefe, 1999; OPAC, 1994; Michelle Wood, pers. comm., 1999; Chris Cziesla, pers. comm., 1999; Good, 1994; CNHPWG, 1994</p> <p>ODFW, 1999; Steve Berkeley, pers. comm., 1999; Hal Weeks, pers. comm., 1999; Brown, 1987; ODFW, 1999; O'Keefe, 1999; OPAC, 1994; Good, 1994; CNHPWG, 1994</p>	<p>(3) Empirical studies to gain increased understanding of the dynamics and interactions among members of plant and animal communities that inhabit kelp beds</p> <p>(4) Annual estimates and future predictions of commercial and recreational use of kelp forests and their associated nearshore subtidal rocky reefs</p> <p>Shellfish: Enhanced spatial and temporal monitoring (e.g., location of seed stocks for toxins)</p>
<p>Estuarine Systems</p>	<p>Definition 1:</p> <ol style="list-style-type: none"> 1. Change in area of estuarine habitats (acres & percent); 2. Aquatic nuisance species occurrence & extent; 3. Freshwater inflow rate and timing <p>Definition 2:</p> <ol style="list-style-type: none"> 1. Change in area of estuarine habitats (acres & percent); 2. Aquatic nuisance species occurrence & extent; 3. Freshwater inflow rate and timing; 4. Estuarine water quality 	<p>Thomas, 1983; Boule and Biery, 1987; Conright et al., 1987; Simerstad and Fiest, 1996; Hoffnagel et al., 1976; Steve Rumrill, pers. comm. 1999; Kathy Taylor, pers. comm., 1999; Good, 1999; Carlton and Geller, 1993; Paul Heimowitz, pers. comm., 1999; John Chapman, pers. comm., 1999; Bastasch, 1999; Quigley et al., 1999</p> <p>Thomas, 1983; Boule and Biery, 1987; Conright et al., 1987; Simerstad and Fiest, 1996; Hoffnagel et al., 1976; Steve Rumrill, pers. comm. 1999; Kathy Taylor, pers. comm., 1999; Good, 1999; Carlton and Geller, 1993; Paul Heimowitz, pers. comm., 1999; John Chapman, pers. comm., 1999; Bastasch, 1999; Quigley et al., 1999; NOAA, 1998; Skelton, 1999 (DEQ data); Greg McMurray, pers. comm., 1999</p>	<p>1. Additional monitoring to help understand the full range of ecosystem functions, goods, and services that restored habitat provide. This data helps set priorities for limited restoration funds. 2. Information about stream flow changes over the past 150 years and the impacts of those changes. 3. Estimates of historic flow levels and timing prior to major watershed alterations and withdrawals. 4. Flow comparisons to recent data, present withdrawals, projections of future water needs and in-stream water needs for health maintenance. 5. Empirical studies to analyze the effects and the degree of effects of upstream water withdrawal on Oregon estuaries. 6. Estimate the risk of decreased freshwater inflow and develop strategies to maintain it at minimum levels for ecological health 7. Land use/land cover mapping at regular intervals</p>