

Alaska Habitat Management Guide

Impacts of Land and Water Use on Fish and Their Habitat

Part I

Produced by
State of Alaska Department of Fish and Game
Division of Habitat



Juneau, Alaska
1986

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Acknowledgements

This project is under the direction of the Commissioner of the Department of Fish and Game, Don W. Collinsworth, the Director of the Division of Habitat, Norman A. Cohen, and the Deputy Director, Bruce H. Baker.

Many individuals have been involved in the production of this two-part fisheries impacts volume. All products were viewed first by project staff and distributed for technical reviews. The names of reviewers and other contributors are compiled in appendix A.

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The process of developing the initial plan and procedures for this project involved a number of individuals who are not otherwise listed as authors and contributors. These include many of the staff within the Division of Habitat, as well as planners, research and management coordinators, and

regional supervisors of other divisions. Special mention should be made of the support from Alvin G. Ott, Rick Reed, Lance Trasky, and Carl Yanagawa, Regional Supervisors of the Division of Habitat for the Interior-Arctic, Southeast, Western and Southwest, and Southcentral regions, respectively. We would also like to acknowledge the many contributions of John A. Clark, who was Director of the Division of Habitat until his death in 1985.

General Introduction

Overview of the Habitat Management Guides Project

Background

Alaska is an immense and bountiful frontier, and until recently it was almost inconceivable that we would ever need to worry about its capacity to sustain the wealth of fish and wildlife resources for which it is renowned. But the impetus of progress has not abated, and the pressure to develop our lands and waters intensifies daily. Every year more lands in Alaska are being proposed for uses other than as wildlife habitat, especially around cities, towns, and villages. These proposed uses include logging, mining, agriculture, settlement, and geothermal, oil and gas, and hydroelectric projects, among others. As the number of proposals and plans for development continues to increase, so does the need to carefully and efficiently evaluate their possible effects upon species and habitats, and upon human use of species. Once these evaluations have been completed we can recommend viable managerial options to guarantee that our valuable fish and wildlife resources and habitats, and uses of these fish and wildlife resources are adequately protected and maintained. By using appropriate planning and managerial techniques most of the potential for damage to fish and wildlife resources and loss of human use of these resources can be avoided.

One of the responsibilities of the Alaska Department of Fish and Game (ADF&G) is to assist land managers by recommending to them the best ways and means, based upon the best available data, for protecting fish and wildlife resources and human use of these resources against impacts. Because many proposals and plans for development and land uses require a rapid response from the department, there may not be enough time for staff to actually study the specific area in which the proposed development is to occur. However, the department still needs to accumulate and assess a wide variety of information in order to prepare recommendations for managing habitat. Therefore, the department initiated the Alaska Habitat Management Guides (AHMG) project to prepare reports of the kinds of information upon which its recommendations must be founded in order to responsibly and rapidly address land and water use proposals made by land managers.

Purpose

The Alaska Habitat Management Guides (AHMG) present the best available information on selected fish and wildlife species: mapping and discussing their geographical distribution; assessing their relative abundance; describing their life functions and habitat requirements; identifying the human uses made of them; describing their role in the state's economy;

determining the impacts of human land uses and developments on these species; and developing guidelines to avoid or minimize such impacts.

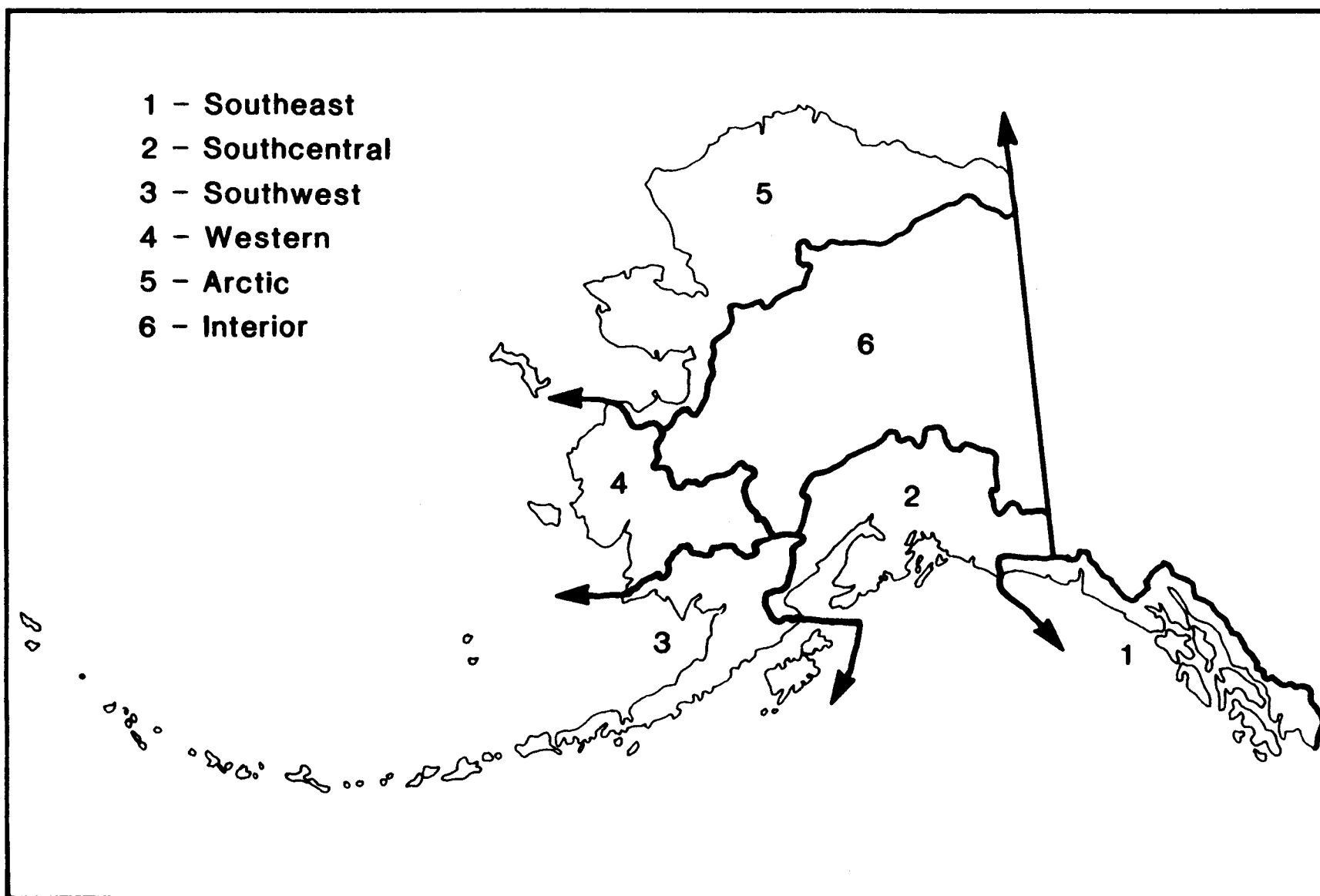
Essential to assessing what might happen to fish and wildlife if their habitats are altered is information about what impacts are typically associated with particular kinds of developmental activities. The habitat management guides therefore also provide summaries of these known impacts. This information, in conjunction with compiled species life history and distribution information, will allow those concerned to estimate to what degree fish and wildlife species and habitats are liable to be impacted and to develop recommendations for the avoidance or minimization of such impacts.

The completed guides coverage of fish and wildlife resources encompasses the Fish and Game Resource Management Regions established by the Joint Board of Fisheries and Game (map 1). These regions provide the most inclusive and consistent format for presenting information and fish and wildlife resources and relating it to management activities and data collection efforts within the department.

Applications

The choice of the term "guides" rather than "plans" for the reports is consistent with the largely advisory role of the department with respect to land management issues. The guides will provide the department as well as other state, federal, and private land managers with information necessary for the development of land and water use plans. Thus, the guides themselves are not land management plans, and neither do they provide for the allocation or enhancement of fish and wildlife populations. Information included in the guides will be used by the department's staff during their involvement in the land use planning endeavors of various land managers. For specific land use planning efforts, the department joins with other agencies to recommend particular uses of Alaska's lands and waters, as, for example, in plans by the Department of Natural Resources (Susitna Area Plan, Tanana Basin Area Plan, Southeast Tidelands Area Plan). The public, by means of the public review that is an integral part of land management agencies' planning processes, then has an opportunity to evaluate any recommendations made by the ADF&G that are incorporated by the land management agency.

The guides have been designed to provide users with interrelated subject areas that can be applied to specific questions regarding habitat management. Each type of data will be presented in a separate volume, as indicated in figure 1. Material from the project's database can be used, for example, to correlate information on species' seasonal and geographic habitat use with the written and mapped information on known distribution and abundance. The narratives and maps regarding human uses of fish and wildlife can be compared with abundance and distribution information to obtain an indication of the overall regional patterns of distribution,



Map 1. The six regions of the Alaska Habitat Management Guides.

ALASKA HABITAT MANAGEMENT GUIDES PROJECT

Regional Information

Life Histories and
Habitat Requirements of
Fish and Wildlife

Distribution, Abundance,
and Human Use of
Fish and Wildlife

Reference Maps of the
Distribution and Use of
Fish and Wildlife

Index Maps of the
Distribution and Use of
Fish and Wildlife

Statewide Information

Economic Overview of
Fish and Wildlife

Impacts of Land and
Water Use on Fish,
Wildlife, Habitat, and
Human Use

Guidelines for the
Protection of Fish and
Wildlife Species, Their
Habitats, and
Human Use

Figure 1. Types of narratives and maps produced by the Alaska Habitat Management Guides Project.

abundance, and human use for the species of interest. The specific information on habitat requirements also relates directly to the information on impacts associated with land and water use. This in turn forms the basis for the preparation of habitat management guidelines.

An additional purpose of this project is to identify gaps in the information available on species, human uses, and associated impacts. A particular species, for example, may be known to use certain habitats during certain seasons; yet information on the timing of these use patterns may be inadequate. In general, there is little documentation of impacts from land and water uses on species' habitats and on the human use of those species, or on the economic values associated with the use of fish and wildlife resources.

To maintain their usefulness these habitat management guides are designed to be periodically updated as new research and habitat management options are reported to fill data gaps. However, users of these guides are advised to consult with the appropriate species experts and area biologists to check on the availability of more recent information.

Introduction to Part 1

Purpose

As was mentioned above, a primary goal of the AHMG is to offer land management options for mitigating impacts to Alaska's fish and wildlife resources. Toward realizing this goal, a two-part volume has been prepared containing information on documented impacts of land and water development on marine fish and shellfish, freshwater fish, and their habitats. This first part contains the index to and supplemental materials for the annotated bibliography, which is presented in part 2. Together, the two parts provide information that has been used to prepare the mitigation guidelines for habitat management that are compiled in a separately bound volume. The information presented here, in concert with information from the other AHMG volumes, can also be used to tailor recommendations to protect fish species and their habitat during the planning phase of a specific project.

Approach

For the purposes of this volume, the term "impact" is defined as direct adverse effects to marine and freshwater fish or their habitat as a consequence of human use or development of land or water. The principle of including only documented impacts is a consequence of the recognition that in order to prevent further impacts, it is necessary to evaluate those impacts that have already been shown to adversely affect a species or its

habitat. Several criteria have governed the selection of references to impacts discussed in this volume. Foremost among these criteria was that the referenced impact must have been objectively documented (i.e., observed or demonstrated rather than merely suspected or inferred). Secondly, the conclusions regarding impacts must have been substantiated by the data presented. Thirdly, the impact must be relevant to Alaska. To meet this last criterion, the impact need not have occurred in the state provided that sufficient information was supplied in the literature to substantiate its relevance--that, for example, the impact affected a species or its habitat in a geographic locale having features similar to those in Alaska. Also, laboratory studies were included if they involved topics that are relevant to development in Alaska. Preference was given but not limited to Alaskan species. In some cases, literature review papers were included if they were judged to be objective reviews of documented impacts literature. References that were reviewed but did not meet the above criteria are on file with the department.

Organization of the Volume

This first part of the two-part volume contains the introductory materials, the indices for locating literature by topic, a users guide to accessing the information compiled in the volumes, and several appendices. Part 2 consists almost entirely of the annotated bibliography itself.

The conceptual approach for organizing the literature follows the hierarchical relationships among land and water uses, specific developmental activities, and the resultant environmental impacts associated with each activity. The hierarchical relationships among these three organizational units are depicted in figure 2. Eighteen land and water uses were identified as important in the State of Alaska (appendix B). However, each of these uses (e.g., fire management, oil and gas development, placer mining) involves several types of activities that have been shown to cause environmental damage. To better coordinate with the way the literature is reported, the 18 land and water uses were subdivided into 30 individual components referred to in this document as activities. The activities associated with each use are depicted in table 1, and a description of each activity is provided in appendix C. These 30 activities form the primary organizational structure for the first of the two indices to the literature (see Activity Index).

The second index to the literature is organized by type of impacts to fish or their habitat (see Impact Index). The 22 impacts identified are provided in appendix D. From a biological perspective it is the impact itself that is important, regardless of its origin. The primary value of indexing the literature by impact is that it provides the user with a more comprehensive body of literature that is derived from studies involving several kinds of activities. Thus, if the literature documenting a particular impact from one activity is scant, the user can evaluate other studies under consideration that, although involving different activities, pertain to the

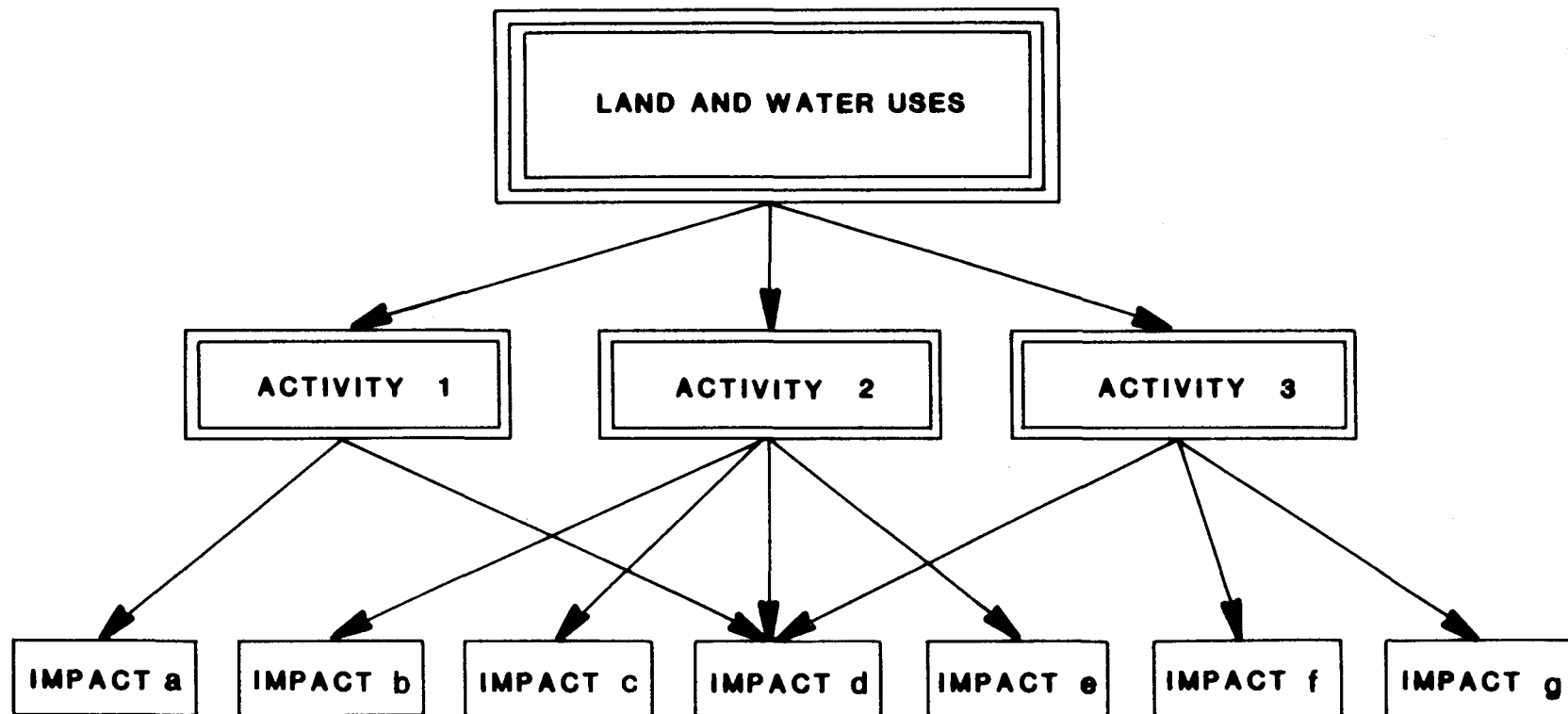


Figure 2. General hierarchical relationships of land and water uses, activities, and impacts.

Table 1. Activities Involved in Each Land or Water Use or Development Type

Land / Water Use	Activity *																													
	Blasting	Burning	Channelizing waterways	Chemical application	Clearing and tree harvest	Draining	Dredging	Drilling	Fencing	Filling and pile-supported structures (aquatic)	Filling (terrestrial)	Grading/plowing	Grazing	Human disturbance	Log storage/transport	Netting	Processing geothermal energy	Processing lumber/kraft/pulp	Processing minerals (including gravel)	Processing oil/gas	Sewage disposal	Solid waste disposal	Stream crossing - fords	Stream crossing - structures	Transport of oil/gas/water - land	Transport of oil/gas/water - water	Transport personnel/equipment/material - air	Transport personnel/equipment/material - land	Transport personnel/equipment/material - water	Water regulation/withdrawal/irrigation
Commercial fishing																														
Fire management	X			X	X																									
Geothermal energy development	X	X		X	X												X	X	X	X	X	X								
Grain and hay farming			X	X	X	X												X	X	X	X									
Harbors and shoreline structures	X	X	X	X	X													X	X	X	X									
Offshore prospecting and mining	X																	X	X	X	X									
Oil and gas development	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Pipelines	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Placer mining	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Red meat and dairy farming																														
Seafood processing		X	X	X	X	X																								
Settlement	X	X	X	X	X	X																								
Silviculture and timber processing	X	X	X	X	X	X																								
Strip and open pit mining	X	X	X	X	X	X																								
Transmission corridors	X	X	X	X	X	X																								
Transport - air, rail, road	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Underground mining	X																													
Water development	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X

* - For description of each activity, see appendices. Activities involved in road construction are discussed under each use for which roads are required.

impact under consideration. The user then can judge whether or not the documented literature applies to his or her situation.

Within both the activity and impact indices, separate parts are presented for marine and freshwater fish. Summaries of the literature for both marine and freshwater fish are provided in tables 2 and 3, respectively (see pages 32 and 62). In each table, documented literature was located for the indicated activity/impact combinations.

One very important component of this volume is presented in appendix F. This appendix contains an assortment of literature that was located but because of time constraints could not be annotated and is not included in either index. Much of this material, however, is pertinent impacts literature and is located in the Division of Habitat Library.

Users Guide

Users of this volume will undoubtedly have in mind a number of terms for various developmental activities that differ from those we selected. In view of this, we developed a list of cross-references that correlate a variety of common terms with the terminology used to organize the literature in this volume. This list is found in the yellow pages section. Until users become familiar with our terms, it is suggested they adopt the following stepwise approach to obtaining the information they require:

Step 1

Define the list of terms that best describe your topic of interest, and consult the yellow page section to locate your terms. In cases where you are unable to locate your terms, seek out closely related terms, very much as you would do when using "the yellow pages" of a telephone book.

Step 2

After completing step 1, you will be equipped with appropriate terms for either the activity or impact index. Select the appropriate index. If you are unsure which index to use, consult appendices C and D for lists of activities and impacts, respectively.

Step 3

For both the activity and impact indices, note that they are partitioned into two parts, marine fish and freshwater fish. Select the one that best suits your needs.

Step 4a

Regarding the activity index, to obtain all pertinent references for the activity of interest you must extract the unique references cited for all impact categories listed under that activity.

Step 4b

As regards the impact index, in order to extract all pertinent references for a given impact category the user must extract all unique references contained within each activity listed under that impact.

Step 5

After you have derived your list of citations, consult the annotated bibliography (part 2 of this volume, bound separately). Annotated references are listed alphabetically by author in the bibliography.

Step 6

Consult appendix F to see if there are additional, unannotated references that pertain to your topic of interest.

Application of the information contained in the annotations is the responsibility of the user. If the abstract is insufficient to determine the relevance of the study to a particular need, the source document should be obtained. In any case, it is highly recommended that the original source be examined before the citation is used. The Division of Habitat Library has copies of all annotated references. To obtain the desired reference from the library, please make use of the alpha-numeric code provided at the end of the bibliographic citation. This code is the citation number for the reference. Codes beginning with "B" and "R" correspond to books and reprints, respectively.

In the event that you discover a citation that obviously does not belong to the topic you are searching, please be patient. This is an automated product and has not been used enough to identify all these types of problems. Please take the time to notify us of the problem. Correction forms are located in appendix E of this volume. Directions are provided on the form.

Methods

Four basic methods were used to retrieve literature. Two of the methods, computer and library searches, were used to provide a reasonable cross section of background work pertaining to the desired topics. The other two methods, personal contacts and letters of inquiry, were used as a means of obtaining specific and selective literature. It was envisioned that these methods would collectively provide both a reasonable cross section of the available literature and specific "best available" information.

Literature was usually located as a reference, which then had to be retrieved. Retrieval of the references was most often accomplished by interlibrary loan. The ADF&G Division of Habitat Library processed approximately 1,000 loan requests for the project. Once received, each reference (book or reprint from a journal) was evaluated. If it met the criteria for inclusion, it was annotated and coded on a Data General mini-computer according to the subject to which it pertained and was subsequently placed in the library as part of the permanent library holdings. Books that did not meet our criteria were returned to the sender, and reprints were placed in the library files.

Cross-reference of Activities

The purpose of this alphabetical list of terms is to provide a translation from a diverse set of common terms into a discrete set of terms that are used to organize the literature in this document. If not otherwise indicated, all common terms are translated into corresponding activity terms. Citations pertaining to these terms are provided in the Activity Index. For your convenience, all terms used to organize the literature are also included in the list of common terms (i.e., land and water uses, defined activities, and impacts). For each of these terms users are directed to the appropriate table in the text where the term is cross-referenced to other related terms.

Agriculture - see Grading/plowing; Grazing; Fencing

Agricultural runoff - see Chemical application

Airgun - see Blasting

Alkalinity - this is included in the defined impact Change in levels of pH, alkanlinity, or hardness; see table 2 or 3 for a list of associated activities resulting in this impact to marine or freshwater fish habitat, respectively.

All-terrain vehicle - see Transport of personnel/equipment/material - land

Aquaculture - see alternative cross-reference term Impoundment

Artificial island - see Filling and pile-supported structures (aquatic and wetland habitats)

Bank stabilization - see Channelizing waterways

Bark leachate - this is included in the defined impact Change in levels of other toxic compounds - bark or log leachates; see table 2 or 3 for a list of associated activities resulting in this impact to marine or freshwater fish habitat, respectively.

Barrier - this is included in three defined impacts 1) Addition of physical barriers - impoundments; 2) Addition of physical barriers - diversions; and 3) Addition of physical barriers - partial obstructions; see table 2 or 3 for a list of associated activities resulting in this impact to marine or freshwater fish habitat, respectively.

Biocide - this is included in the defined impact Change in levels of biocides; see table 2 or 3 for a list of associated activities resulting in this impact to marine or freshwater fish habitat, respectively.

Blasting - this is a defined activity; see table 2 or 3 for a list of associated impacts on marine or freshwater fish habitat, respectively.

Boat - see Human disturbance; Transport of personnel/equipment/material - water

Borrow pit - see Dredging; Grading/plowing

Breakwater - see Filling and pile-supported structures (aquatic and wetland habitats)

Bridge - see Stream crossing - structures

Buffer strip - see Clearing and tree harvest; Grading/plowing; Grazing; Channelizing waterways

Burning - this is a defined activity; see table 2 or 3 for a list of associated impacts on marine or freshwater fish habitat, respectively.

Camping - see Human disturbance

Canal - see Channelizing waterways; Dredging

Causeway - see Filling and pile-supported structures (aquatic and wetland habitats)

Chaining - see Clearing and tree harvest

Channelizing waterways - this is a defined activity; see table 2 or 3 for a list of associated impacts on marine or freshwater fish habitat, respectively.

Chemical application - this is a defined activity; see table 2 or 3 for a list of associated impacts on marine or freshwater fish habitat, respectively.

Chemical storage - see Chemical application

Chlorine - this is included in the defined impact Change in levels of chlorinated compounds; see table 2 or 3 for a list of associated activities resulting in this impact to marine or freshwater fish habitat, respectively.

Clearing and tree harvest - this is a defined activity; see table 2 or 3 for a list of associated impacts on marine or freshwater fish habitat, respectively.

Clear-cutting - see Clearing and tree harvest

Right-of-way maintenance - see Transport of personnel/equipment/material - land

Commercial fishing - this is a defined water use; see table 1 for a list of associated activities.

Containing wall - see Channelizing waterways

Contouring land - see Grading/plowing

Cooling pond - see alternative cross-reference term Impoundment

Cover:

Aquatic vegetation - this is included in the defined impact Alteration of natural cover - aquatic vegetation; see table 2 or 3 for a list of associated activities resulting in this impact on marine or freshwater fish habitat, respectively.

Bank or shoreline - this is included in the defined impact Alteration of natural cover - overhanging bank or shoreline; see table 2 or 3 for a list of associated activities resulting in this impact on marine or freshwater fish habitat, respectively.

Riparian vegetation - this is included in the defined impact Alteration of natural cover - riparian vegetation; see table 2 or 3 for a list of associated activities resulting in this impact on marine or freshwater fish habitat, respectively.

Creosote - see Filling and pile-supported structures (aquatic and wetland habitats)

Crossing stream - see Stream crossing - structures; Stream crossing - fords

Culvert - see Stream crossing - structures

Dam - see Impoundment

Defoliant - see Chemical application

Clearing and tree harvest - this is a defined activity; see table 2 or 3 for a list of associated impacts on marine or freshwater fish habitat, respectively.

Depth of water - this is included in the defined impact Change in depth or velocity of water; see table 2 or 3 for a list of associated activities resulting in this impact on marine or freshwater fish habitat, respectively.

Dike - see Filling and pile-supported structures (aquatic and wetland habitats); Channelizing waterways

Disposal:

Chemicals/toxic waste - see Solid waste disposal; Sewage disposal

Dredge spoil - see Solid waste disposal

Drilling muds/cuttings - see Solid waste disposal

Effluent waste from processing - see Processing lumber/kraft/pulp; Processing oil/gas; Processing minerals

Fill material - see Filling (terrestrial); Filling and pile-supported structures (aquatic and wetland habitats)

Fishing net (lost or discarded) - see Netting

Garbage/debris - see Solid waste disposal

Human waste - see Sewage disposal

Mine tailings - see Solid waste disposal

Overburden - see solid waste disposal

Seafood waste - see Solid waste disposal

Dissolved oxygen - this is included in the defined impact Change in levels of dissolved oxygen or nitrogen; see table 2 or 3 for a list of associated activities resulting in this impact on marine or freshwater fish habitat, respectively.

Ditching - see Channelizing waterways

Diversion of watercourses - see Water regulation/withdrawal/irrigation; channelizing waterways

Dock - see Filling and pile-supported structures (aquatic and wetland habitats)

Dragline - see Dredging

Draining - this is a defined activity; see table 2 or 3 for a list of associated impacts on marine or freshwater fish habitat, respectively.

Dredging - this is a defined activity; see table 2 or 3 for a list of associated impacts on marine or freshwater fish habitat, respectively.

Drilling - this is a defined activity; see table 2 or 3 for a list of associated impacts on marine or freshwater fish habitat, respectively.

Drilling island - see Filling and pile-supported structures (aquatic and wetland habitats)

Drilling mud (disposal) - see Solid waste disposal

Drilling platform - see Drilling; Solid waste disposal

Drilling ship - see Drilling; Solid waste disposal

Dumping - see Solid waste disposal

Dynamite - see Blasting

Effluent waste:

Lumber processing - see Processing lumber/kraft/pulp

Mineral processing - see Processing minerals

Oil and gas processing - see Processing oil/gas

Other - see Sewage disposal

Entrainment - this is included in the defined impact Impingement or entrainment or entanglement; see table 2 or 3 for a list of associated activities resulting in this impact on marine or freshwater fish habitat, respectively.

Erosion:

Agricultural - see Grading/plowing; Grazing

Clearing activities - see Clearing and tree harvest

Road building - see Grading/plowing

Other - see specific activity causing erosion

Excavation:

Aquatic and wetland habitats - Channelizing waterways; Dredging; Blasting

Terrestrial - see Grading/plowing; Blasting

Explosive - see Blasting

Farming - see Grading/plowing; Grazing; Fencing

Feedlot - see Grazing

Fencing - this is a defined activity; see table 2 or 3 for a list of associated impacts on marine or freshwater fish habitat, respectively.

Fertilizer - see Chemical application

Filling (aquatic and wetland habitats) - this is a defined activity; see table 2 or 3 for a list of associated impacts on marine or freshwater fish habitat, respectively.

Filling (terrestrial) - this is a defined activity; see table 2 or 3 for a list of associated impacts on marine or freshwater fish habitat, respectively.

Fire - see Burning

Fire management - this is a defined land use; see table 1 for a list of associated activities.

Flood control - see Water regulation/withdrawal/irrigation

Fords - see Stream crossing - fords

Fuel truck - see Transport of oil/gas/water - land

Gabion - see Channelizing waterways; Filling and pile-supported structures (aquatic and wetland habitats)

Garbage - see Solid waste disposal

Gathering lines - Transport of oil/gas/water - land

Geothermal energy development - this is a defined land/water use; see table 1 for a list of associated activities.

Grading/plowing - this is a defined activity; see table 2 or 3 for a list of associated impacts on marine or freshwater fish habitat, respectively.

Grain and hay farming - this is a defined land/water use; see table 1 for a list of associated activities.

Gravel extraction - see Dredging; Grading/plowing

Grazing - this is a defined activity; see table 2 or 3 for a list of associated impacts on marine or freshwater fish habitat, respectively.

Harbors and shoreline structures - this is a defined land/water use; see table 1 for a list of associated activities.

Hardness - this is included in the defined impact Change in levels of pH, alkalinity, or hardness; see table 2 or 3 for a list of associated activities resulting in this impact on marine or freshwater fish habitat, respectively.

Harvesting trees - see Clearing and tree harvest

Heavy metal - this is included in the defined impact Change in levels of heavy metals; see table 2 or 3 for a list of associated activities resulting in this impact on marine or freshwater fish habitat, respectively.

Herbicide - see Chemical application

Highway runoff - see Transport of personnel/equipment/material - land

Hiking - see Human disturbance

Hovercraft - see Transport of personnel/equipment/material - air

Human disturbance - this is a defined activity; see table 2 or 3 for a list of associated impacts on marine or freshwater fish habitat, respectively.

Hydrocarbon - this is included in the defined impact Change in levels of hydrocarbons; see table 2 or 3 for a list of associated activities resulting in this impact on marine or freshwater fish habitat, respectively.

Hydroelectric dam - see alternative cross-reference term Impoundment

Icebreaker - see Transport of personnel/equipment/material - water

Impingement - this is included in the defined impact Impingement or entrainment or entanglement; see table 2 or 3 for a list of associated activities resulting in this impact on marine or freshwater fish habitat, respectively.

Impoundment:

Construction - see Filling and pile-supported structures (aquatic and wetland habitats)

Operation - see Water regulation/withdrawal/irrigation

Insecticide - see Chemical application

Irrigation - see Water regulation/withdrawal/irrigation

Jetty - see Filling and pile-supported structures (aquatic and wetland habitats)

Livestock - see Grazing

Log dumping - see Log storage/transport

Log leachate - this is included in the defined impact Change in levels of other toxic compounds - bark or log leachates; see table 2 or 3 for a list of associated activities resulting in this impact on marine or freshwater fish habitat, respectively.

Log rafting - see Log storage/transport

Log skidding - see Clearing and tree harvest

Log storage/transport - this is a defined activity; see table 2 or 3 for a list of associated impacts on marine or freshwater fish habitat, respectively.

Low-water crossing - see Stream crossing - fords

Mining:

Concentrating - see Processing minerals

Extraction - see Grading/plowing; Blasting

Lode - see Blasting; Solid waste disposal

Placer - see Processing minerals; Grading/plowing; Channelizing waterways

Sluicing - see Processing minerals

Smelting - see Processing minerals

Strip and open pit - see Grading/plowing; Processing minerals; Dredging; Solid waste disposal; Blasting

Washing - see Processing minerals

Netting - this is a defined activity; see table 2 or 3 for a list of associated impacts on marine or freshwater fish habitat, respectively.

Nitrogen (gas) - this is included in the defined impact Change in levels of dissolved oxygen or nitrogen; see table 2 or 3 for a list of associated activities resulting in this impact to marine or freshwater fish habitat, respectively.

Noise - this is included in the defined impact Increase in hydrostatic pressure or noise; see table 2 or 3 for a list of associated activities resulting in this impact to marine or freshwater fish habitat, respectively.

Nutrients - this is included in the defined impact Change in levels of nutrients; see table 2 or 3 for a list of associated activities resulting in this impact to marine or freshwater fish habitat, respectively.

Off-road vehicle - see Transport of personnel/equipment/material - land

Offshore prospecting and mining - this is a defined water use; see table 1 for a list of associated activities.

Oil and gas development - this is a defined land/water use; see table 1 for a list of associated activities.

Oil tanker:

Aquatic habitats - see Transport of oil/gas/water - water

Terrestrial habitats - see Transport of personnel/equipment/material - land

PH - this is included in the defined impact Change in levels of pH, alkalinity, or hardness; see table 2 or 3 for a list of associated activities resulting in this impact to marine or freshwater fish habitat, respectively.

Paper mill - see Processing lumber/kraft/pulp

Pesticide - see Chemical application

Phantom net - see Netting

Pier - see Filling and pile-supported structures (aquatic and wetland habitats)

Piling - see Filling and pile-supported structures (aquatic and wetland habitats)

Pipeline - this is a defined land/water use; see table 1 for a list of associated activities.

Placer mining - this is a defined land/water use; see table 1 for a list of associated activities.

Plowing - see Grading/plowing

Powerline - see Transport of personnel/equipment/material - land

Pressure - this is included in the defined impact Increase in hydrostatic pressure or noise; see table 2 or 3 for a list of associated activities resulting in this impact on marine or freshwater fish habitat, respectively.

Primacord - see Blasting

Processing geothermal energy - this is a defined activity; see table 2 or 3 for a list of associated impacts on marine or freshwater fish habitat, respectively.

Processing lumber/kraft/pulp - this is a defined activity; see table 2 or 3 for a list of associated impacts on marine or freshwater fish habitat, respectively.

Processing minerals - this is a defined activity; see table 2 or 3 for a list of associated impacts on marine or freshwater fish habitat, respectively.

Processing oil/gas - this is a defined activity; see table 2 or 3 for a list of associated impacts on marine or freshwater fish habitat, respectively.

Pumping station - see Transport of oil/gas/water - land

Range management - see Grazing

Quarry - see Blasting; Grading/plowing; Processing minerals

Railroad - see Transport of personnel/equipment/material - land

Ranching - see Grazing; Fencing

Recreational activity - see Human disturbance

Red meat and dairy farming - this is a defined land use; see table 1 for a list of associated activities.

Refinery - see Processing minerals; Processing oil/gas

Reservoir - see alternative cross-reference term Impoundment

Right-of-way maintenance - see Transport of personnel/equipment/material - land

Riparian vegetation - see Clearing and tree harvest; Grazing; Grading/plowing

Riprap - see Filling and pile-supported structures (aquatic and wetland habitats); Channelizing waterways

Runoff:

Logging - see Clearing and tree harvest

Urban - see Transport of personnel/equipment/material - land

Other - see specific activity causing runoff

Road construction - see Grading/plowing; Blasting

Road maintenance (salting/sanding) - see Chemical application

Salinity - this is included in the defined impact Change in level of salinity; see table 2 or 3 for a list of associated activities resulting in this impact on marine or freshwater fish habitat, respectively.

Scraping - see Grading/plowing

Seafood processing - this is a defined land/water use; see table 1 for a list of associated activities.

Seafood waste - see Solid waste disposal

Seismic exploration - see Blasting; Drilling

Settlement - this is a defined land use; see table 1 for a list of associated activities.

Sewage disposal - this is a defined activity; see table 2 or 3 for a list of associated impacts on marine or freshwater fish habitat, respectively.

Shipping - see Transport of oil/gas/water - water; Transport of personnel/equipment/material - water

Shock wave - see Blasting

Shoreline alteration - see Dredging; Filling and pile-supported structures (aquatic and wetland habitats)

Silviculture and timber processing - this is a defined land use; see table 1 for a list of associated activities.

Sluicing - see Processing minerals

Solid waste disposal - this is a defined activity; see table 2 or 3 for a list of associated impacts on marine or freshwater fish habitat, respectively.

Spills:

Chemical - see Transport of personnel/equipment/material - water; Transport of personnel/equipment/material - land; Transport of personnel/equipment/material - air; Processing lumber/kraft/pulp; Processing minerals

Oil/gas - see Transport of oil/gas/water - water; Transport of oil/gas/water - land; Processing oil/gas

Spoil disposal - see Solid waste disposal; Filling (terrestrial); Filling and pile-supported structures (aquatic and wetland habitats)

Stream crossing - fords - this is a defined activity; see table 2 or 3 for a list of associated impacts on marine or freshwater fish habitat, respectively.

Stream crossing - structures - this is a defined activity; see table 2 or 3 for a list of associated impacts on marine or freshwater fish habitat, respectively.

Stream diversion:

Construction - see Channelizing waterways

Operation - see Water regulation/withdrawal/irrigation

Strip and open-pit mining - this is a defined land use; see table 1 for a list of associated activities.

Subsistence fishing - not included

Substrate:

Addition - this is included in the defined impact Addition of substrate materials; see table 2 or 3 for a list of associated activities resulting in this impact on marine or freshwater fish habitat, respectively.

Disturbance - this is included in the defined impact Physical disturbance of substrate materials; see table 2 or 3 for a list of associated activities resulting in this impact on marine or freshwater fish habitat, respectively.

Permeability - this is included in the defined impact Change in depth or velocity of water; see table 2 or 3 for a list of associated activities resulting in this impact on marine or freshwater fish habitat, respectively.

Removal - this is included in the defined impact Removal of substrate materials; see table 2 or 3 for a list of associated activities resulting in this impact on marine or freshwater fish habitat, respectively.

Sulfurous compounds - this is included in the defined impact Change in levels of other toxic compounds - sulfurous compounds; see table 2 or 3 for a list of associated activities resulting in this impact on marine or freshwater fish habitat, respectively.

Surveying - see Transport of personnel/equipment/material - land

Suspended sediment - this is included in the defined impact Change in turbidity or suspended sediments; see table 2 or 3 for a list of associated activities resulting in this impact on marine or freshwater fish habitat, respectively.

TNT - see Blasting

Tailings - see Solid waste disposal

Temperature of water - this is included in the defined impact Change in water temperature; see table 2 or 3 for a list of associated activities resulting in this impact on marine or freshwater fish habitat, respectively.

Tourists:

In vehicles - see Transport of personnel/equipment/material - land

On foot - see Human disturbance

Toxic material - see Chemical application; Solid waste disposal; Sewage disposal; Transport of personnel/equipment/material - water

Traffic - see Transport of personnel/equipment/material - land; Human disturbance

Trampling - this is included in the defined impact Physical trampling or crushing; see table 2 or 3 for a list of associated activities resulting in this impact on marine or freshwater fish habitat, respectively.

Transmission corridors - this is a defined land use; see table 1 for a list of associated activities.

Transmission line (electric or telephone) - see Transport of personnel/equipment/material - land

Transport - air, land, water - this is a defined land/water use; see table 1 for a list of associated activities.

Transport of oil/gas/water - land - this is a defined activity; see table 2 or 3 for a list of associated impacts on marine or freshwater fish habitat, respectively.

Transport of oil/gas/water - water - this is a defined activity; see table 2 or 3 for a list of associated impacts on marine or freshwater fish habitat, respectively.

Transport of personnel/equipment/material - air - this is a defined activity; see table 2 or 3 for a list of associated impacts on marine or freshwater fish habitat, respectively.

Transport of personnel/equipment/material - land - this is a defined activity; see table 2 or 3 for a list of associated impacts on marine or freshwater fish habitat, respectively.

Transport of personnel/equipment/material - water - this is a defined activity; see table 2 or 3 for a list of associated impacts on marine or freshwater fish habitat, respectively.

Transportation/utility corridor - see Transport of personnel/equipment - land

Turbidity - this is included in the defined impact Change in turbidity or suspended sediments; see table 2 or 3 for a list of associated activities resulting in this impact on marine or freshwater fish habitat, respectively.

Underground mining - this is a defined land/water use; see table 1 for a list of associated activities.

Urban runoff - see Transport of personnel/equipment/material - land

Velocity of water - this is included in the defined impact Change in depth or velocity of water; see table 2 or 3 for a list of associated activities resulting in this impact on marine or freshwater fish habitat, respectively.

Vibration - see Blasting

Vibroseis - see Blasting

Water development - this is a defined water use; see table 1 for a list of associated activities.

Water regulation/withdrawal/irrigation - this is a defined activity; see table 2 or 3 for a list of associated impacts on marine or freshwater fish habitat, respectively.

Wharf - see Filling and pile-supported structures (aquatic and wetland habitats)

Waste disposal - see Solid waste disposal; Sewage disposal

Wastewater treatment - considered under Impoundment

Well - see Drilling; Water regulation/withdrawal/irrigation

Introduction

This index provides literature citations pertaining to environmental impacts to fisheries resources or their habitats. An annotation for each citation is located in part 2 of this volume (bound separately). This index is divided into two sections: 1) marine fish and shellfish, and 2) freshwater fish. Within each section, citations are organized hierarchically; 30 defined activities form the primary structure (see below), and 22 impact categories form the secondary structure.

Each document referenced in this index is characterized as either a field, laboratory, or review study. This information appears in coded form immediately to the right of each literature citation (F, L, or R, respectively). In addition to this code, an asterisk is used to identify references used as source documents for preparing guidelines on selected activities (contained in a separate volume).

List of Activities

1. Blasting
2. Burning
3. Channelizing waterways
4. Chemical application
5. Clearing and tree harvest
6. Draining
7. Dredging
8. Drilling
9. Fencing
10. Filling (aquatic and wetland habitats)
11. Filling (terrestrial)
12. Grading/plowing
13. Grazing
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16. Netting
17. Processing geothermal energy
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21. Sewage disposal
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23. Stream crossing - fords
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25. Transport of oil/gas/water - land
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28. Transport of personnel/equipment/material - land
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30. Water regulation/withdrawal/irrigation

Marine Fish and Shellfish

This section provides citations pertaining to impacts on marine fish and shellfish or their habitats. Table 2 is a summary of the activities and impacts for which documentation was located. Activities for which documentation has been located are listed in the same order as they are found in table 2. Users should note that no documentation reported for some activity/impact categories may reflect either a real absence of research pertaining to that topic or a lack of completeness of this database, and does not necessarily imply that the activity does not result in adverse impacts to aquatic resources. Activities for which no documentation was located are as follows:

- Burning
- Fencing
- Grazing
- Stream crossing - fords
- Transport of personnel/equipment/material - air

Table 2. Summary of the Literature for Defined Activity/Impact Categories: Marine Fish and Shellfish

Impact	Activity																
	Blasting	Burning	Channelizing waterways	Chemical application	Clearing and tree harvest	Draining	Predging	Drilling	Fencing	Filling (aquatic and wetland habitats)	Filling (terrestrial)	Grading/plowing	Grazing	Human disturbance	Log storage/transport	Netting	Processing geothermal energy
Change in water temperature		X	X	X	X	X	X	X	X	X	X	X				X	X
Change in depth or velocity of water		X	X	X	X	X	X	X	X	X	X	X				X	X
Change in turbidity or suspended sediments		X	X	X	X	X	X	X	X	X	X	X			X	X	X
Addition of substrate materials			X	X	X	X	X	X	X	X	X	X			X	X	X
Removal of substrate materials			X	X	X	X	X	X	X	X	X	X			X	X	X
Physical disturbance of substrate materials			X	X	X	X	X	X	X	X	X	X			X	X	X
Alteration of natural cover:																	
Riparian vegetation										X							
Aquatic vegetation										X				X			
Overhanging bank or shoreline			X						X	X							
Addition of physical barriers:																	
Impoundments																	X
Diversions										X							X
Partial obstructions						X			X					X			X
Other																	
Increase in hydrostatic pressure or noise	X					X	X		X	X			X	X			X
Impingement or entrainment or entanglement														X			X
Physical trampling or crushing													X				
Change in level of dissolved oxygen, nitrogen		X	X	X		X	X		X	X			X	X	X	X	X
Change in levels of pH, alkalinity, or hardness		X		X											X	X	X
Change in level of salinity						X	X		X	X						X	X
Change in levels of heavy metals					X	X	X		X	X			X	X	X	X	X
Change in levels of chlorinated compounds					X	X									X	X	X
Introduction of biocides		X	X		X	X										X	
Change in levels of other toxic compounds:																	
Bark or log leachates			X											X		X	
Sulfurous compounds														X		X	X
Other					X	X	X		X					X		X	X
Change in levels of hydrocarbons				X	X	X	X		X					X		X	X
Change in levels of nutrients			X	X	X	X	X		X				X		X	X	X
Introduction or removal of species					X	X	X		X						X	X	
Artificial attractant to biological organisms	X				X	X	X		X						X		

X - Documented impact

1. Blasting:

a. Increase in hydrostatic pressure or noise

Banner and Hyatt 1973 L
Bishai 1961 L
Falk and Lawrence 1973 F
Goertner 1981 R
Hawkins 1973 R
Hill 1978 R
Hubbs and Rechnitzer 1952 F
Jehl et al. 1980 R
Myrberg 1978 R
Starr et al. 1981 R
Trasky 1976 R
Wiley and Wilson 1975 F
Wright 1982 R

2. Channelizing waterways:

a. Change in water temperature

Darnell et al. 1976 R

b. Change in depth or velocity of water

Darnell et al. 1976 R

c. Change in turbidity or suspended sediments

Darnell et al. 1976 R

d. Change in level of dissolved oxygen, nitrogen

Darnell et al. 1976 R

e. Change in levels of pH, alkalinity, or hardness

Darnell et al. 1976 R

f. Introduction of biocides

Darnell et al. 1976 R

3. Chemical application:

a. Introduction of biocides

Buchanan et al. 1970 L
Koski and Walter 1977 R *

4. Clearing and tree harvest:

a. Change in water temperature

Koski and Walter 1977 R *

b. Change in depth or velocity of water

Koski and Walter 1977 R *

c. Change in turbidity or suspended sediments

Koski and Walter 1977 R *

O'Connor et al. 1976 L *

O'Connor et al. 1977 L

d. Addition of substrate materials

Koski and Walter 1977 R *

O'Connor et al. 1976 L *

O'Connor et al. 1977 L

Smith 1978 L *

e. Removal of substrate materials

O'Connor et al. 1976 L *

O'Connor et al. 1977 L

f. Physical disturbance of substrate

Koski and Walter 1977 R *

O'Connor et al. 1976 L *

O'Connor et al. 1977 L

Smith 1978 L *

g. Removal or alteration of natural cover:
overhanging bank or shoreline

Koski and Walter 1977 R *

h. Change in level of dissolved oxygen, nitrogen

Koski and Walter 1977 R *

O'Connor et al. 1976 L *

O'Connor et al. 1977 L

i. Change in levels of other toxins--bark or log
leachates

Buchanan et al. 1976 L *

Graham and Schaumburg 1969 F *

j. Introduction or removal of species

Koski and Walter 1977 R *

5. Draining:

a. Change in turbidity or suspended sediments

O'Connor et al. 1976 L *

6. Dredging:

a. Change in water temperature

Craig 1985 F
Darnell et al. 1976 R

b. Change in depth or velocity of water

Darnell et al. 1976 R
Nece et al. 1975 F *

c. Change in turbidity or suspended sediments

Allen and Hardy 1980 R
Anderson et al. 1981a F *
Anderson et al. 1981b F *
Anderson et al. 1981c F *
Brannon 1978 R
Burks and Engler 1978 F *
Craig 1985 F
Cronin et al. 1971 R *
Darnell et al. 1976 R
Hirsch et al. 1978 F
Johnston and Wildish 1981 L
Morton 1977 R
Nakai 1977 R
O'Connor et al. 1977 L
Peddicord and McFarland 1976 L
Peddicord and McFarland 1978 L
Salo et al. 1980 F *
Sherk et al. 1976 L
Starr et al. 1981 R
Stern and Stickle 1978 R
Wright 1978 F

d. Addition of substrate materials

Craig 1985 F

Johnston and Wildish 1981 L
 O'Connor et al. 1976 L *
 Smith 1978 L *
 Wright 1978 F

e. Removal of substrate materials

Allen and Hardy 1980 R
 Anderson et al. 1981a F *
 Anderson et al. 1981b F *
 Anderson et al. 1981c F *
 Brannon 1978 R
 Cronin et al. 1971 R *
 Hirsch et al. 1978 F
 Messieh et al. 1981 F
 O'Connor et al. 1977 L
 Peddicord and McFarland 1976 L
 Peddicord and McFarland 1978 L
 Sherk et al. 1976 L
 Starr et al. 1981 R
 Sykes and Hall 1970 F

f. Physical disturbance of substrate

Allen and Hardy 1980 R
 Anderson et al. 1981a F *
 Anderson et al. 1981b F *
 Anderson et al. 1981c F *
 Brannon 1978 R
 Cronin et al. 1971 R *
 Hirsch et al. 1978 F
 O'Connor et al. 1976 L *
 O'Connor et al. 1977 L
 Peddicord and McFarland 1976 L
 Peddicord and McFarland 1978 L
 Smith 1978 L *
 Sykes and Hall 1970 F

g. Addition of physical barriers: partial obstructions

Trent et al. 1976 F *

h. Change in level of dissolved oxygen, nitrogen

Brannon 1978 R
 Burks and Engler 1978 F *
 Darnell et al. 1976 R
 Morton 1977 R
 Nece et al. 1975 F *
 O'Connor et al. 1976 L *

O'Connor et al. 1977 L
Rosenberg 1977 F

i. Change in levels of pH, alkalinity, or hardness

Darnell et al. 1976 R

j. Change in levels of heavy metals

Bias 1981 F
Bryan and Gibbs 1983 F
Burks and Engler 1978 F *
Burrell and Welhs 1983 L
Hirsch et al. 1978 F
Long 1982 R
Morton 1977 R
Peddicord and McFarland 1978 L
Perttola et al. 1982 F
Rosenberg 1977 F
Stern and Stickle 1978 R
Thompson and Paton 1976 L
Wright 1978 F

k. Change in levels of chlorinated compounds

Brannon 1978 R
Burks and Engler 1978 F *
Long 1982 R
Peddicord and McFarland 1978 L
Wright 1978 F

l. Introduction of biocides

Brannon 1978 R
Burks and Engler 1978 F *
Darnell et al. 1976 R
Stern and Stickle 1978 R
Wright 1978 F

m. Change in levels of hydrocarbons

Burks and Engler 1978 F *
Hirsch et al. 1978 F
Wright 1978 F

n. Change in levels of nutrients

Burks and Engler 1978 F *
Hirsch et al. 1978 F
Morton 1977 R

o. Introduction or removal of species

Burks and Engler 1978 F *

Morton 1977 R

Stern and Stickle 1978 R

p. Artificial attractant to biological organisms

Sykes and Hall 1970 F

Wright 1978 F

7. Drilling:

a. Change in water temperature

Hawkins 1973 R

Lawrence and Scherer 1974 L

Linden 1978 L

Varanasi et al. 1981 L

b. Change in turbidity or suspended sediments

Houghton and Beyer 1980 L

Lawrence and Scherer 1974 L

Lees and Houghton 1980 F

Maurer et al. 1981 F

Peddicord and McFarland 1978 L

Tornberg et al. 1980 F

c. Addition of substrate materials

Lees and Houghton 1980 F

Maurer et al. 1981 F

Peddicord and McFarland 1978 L

d. Removal of substrate materials

Maurer et al. 1981 F

e. Physical disturbance of substrate

Peddicord and McFarland 1978 L

f. Increase in hydrostatic pressure or noise

Banner and Hyatt 1973 L

Hawkins 1973 R

Myrberg 1978 R

g. Change in level of salinity

Baden 1982 L
Stickle et al. 1982 L

h. Change in levels of heavy metals

Carls and Rice 1980 L
Carls and Rice 1984 L
Gerber et al. 1980 L
Houghton and Beyer 1980 L
Land 1974 R
Peddicord and McFarland 1978 L
Tornberg et al. 1980 F

i. Change in levels of chlorinated compounds

Land 1974 R
Peddicord and McFarland 1978 L

j. Introduction of biocides

Land 1974 R

k. Change in levels of hydrocarbons

Carls and Rice 1980 L
Carls and Rice 1984 L
Czyzewska 1976 L
Land 1974 R
Lawrence and Scherer 1974 L

l. Change in levels of nutrients

Babcock 1985 L
Baden 1982 L
Brodersen et al. 1977 L
Cameron and Smith 1980 L
Canevari and Lindblom 1976 R
Carls and Rice 1984 L
Collodi et al. 1984 L
Crothers 1983 F
Edwards 1978 L
Fletcher et al. 1981 L
Gerber et al. 1980 L
Griffiths et al. 1982 L
Hartwick et al. 1982 F
Houghton and Beyer 1980 L
Hsiao 1978 L
Hsiao et al. 1978 L
Karinen 1980 R
Korn and Rice 1981 L
Korn et al., in press L

Lees and Houghton 1980 F
 Linden 1978 L
 Lonning and Hagstrom 1976 L
 Malins 1977 F
 Malins and Hodgins 1981 R
 Malins et al. 1981 L
 McKeown 1981 L
 Mecklenburg et al. 1977 L
 Moles 1980 L
 Moles and Rice 1983 L
 Moles et al. 1979 L
 Moles et al. 1981 L
 Neff and Anderson 1981 R
 Norton and Franklin 1980 F
 O'Clair and Rice 1985 L
 Olla and Bejda 1983 L
 Ordzie and Garofalo 1981 L
 Percy 1976 F
 Rice 1981 R
 Rice et al. 1975 L
 Rice et al. 1976a L
 Rice et al. 1976b L
 Rice et al. 1977a L
 Rice et al. 1977b L
 Rice et al. 1979 L
 Rice et al. 1981 L
 Rice et al. 1984 R
 Sekerah and Foy 1978 L
 Shaw et al. 1981 L
 Sprague et al. 1982 R
 Starr et al. 1981 R
 Stickle et al. 1982 L
 Stickle et al. 1984 L
 Taylor and Karinen 1977 L
 Thomas and Rice 1975 L
 Thomas and Rice 1979 L
 Thomas and Rice 1981 L
 Thomas and Rice 1982 L *
 Thomas and Rice, in press L
 Tornberg et al. 1980 F
 Varanasi et al. 1981 L
 Wilson 1974 L
 Wilson 1976 L
 Wilson 1977 L

8. Filling (aquatic and wetland habitats):

a. Change in water temperature

Bishop et al. 1983 R *

Cardwell et al. 1978 F
 Cardwell et al. 1980a F *
 Cardwell et al. 1980b F *
 Carstea et al. 1975 R *
 Craig and Griffiths 1981 F
 Drinkwater 1979 F *
 Elgershuizen 1981 F
 Hastings 1972 F *
 Johnson 1984a R *
 Moles and Pella 1984 L
 Mulvihill et al. 1980 R *
 Nece et al. 1975 F *
 Salo et al. 1980 F *
 Vilks et al. 1975 F

b. Change in depth or velocity of water

Cardwell et al. 1978 F
 Carstea et al. 1975 R *
 Clewell et al. 1976 F
 Drinkwater 1979 F *
 Elgershuizen 1981 F
 Erikson 1984 F *
 Heckman 1984 F *
 Miller and Currin 1981 F
 Mulvihill et al. 1980 R *
 Nece et al. 1975 F *
 Orrell and Johnson 1975 F *
 Sawaragi and Kobune 1970 L *
 Starr et al. 1981 R
 U.S. Army Corps of Engineers 1985 F *
 Washington Dept. of Fisheries 1971 R

c. Change in turbidity or suspended sediments

Carstea et al. 1975 R *
 Elgershuizen 1981 F
 Mulvihill et al. 1980 R *
 Starr et al. 1981 R
 Washington Dept. of Fisheries 1971 R

d. Addition of substrate materials

Anderson et al. 1981a F *
 Anderson et al. 1981b F *
 Anderson et al. 1981c F *
 Cardwell and Koons 1981 F *
 Carstea et al. 1975 R *
 Cronin et al. 1971 R *
 Erikson 1984 F *
 Harris 1981 R *

- Heiser and Finn 1970 F *
 - Millikan et al. 1974 F *
 - Mock 1966 F *
 - Mulvihill et al. 1980 R *
 - Starr et al. 1981 R
 - U.S. Army Coastal Engr. Res. Ctr. 1977 R *
- e. Removal of substrate materials
- Cardwell and Koons 1981 F *
 - Carstea et al. 1975 R *
 - U.S. Army Coastal Engr. Res. Ctr. 1977 R *
- f. Physical disturbance of substrate
- Cardwell and Koons 1981 F *
 - Carstea et al. 1975 R *
 - Elgershuizen 1981 F
 - Trent et al. 1976 F *
 - U.S. Army Coastal Engr. Res. Ctr. 1977 R *
- g. Removal or alteration of natural cover: aquatic vegetation
- Trent et al. 1976 F *
- h. Removal or alteration of natural cover: overhanging bank or shoreline
- Carstea et al. 1975 R *
 - Millikan et al. 1974 F *
 - Salo et al. 1980 F *
 - Starr et al. 1981 R
 - U.S. Army Coastal Engr. Res. Ctr. 1977 R *
 - U.S. Army Corps of Engineers 1981 R *
- i. Addition of physical barriers: diversions
- Cronin et al. 1971 R *
 - Salo et al. 1980 F *
- j. Addition of physical barriers: partial obstructions
- Bishop et al. 1983 R *
 - Cardwell and Koons 1981 F *
 - Cardwell et al. 1978 F
 - Cardwell et al. 1980b F *
 - Carstea et al. 1975 R *
 - Craig and Griffiths 1981 F
 - Cronin et al. 1971 R *

Darnell et al. 1976 R
 Elgershuizen 1981 F
 Erikson 1984 F *
 Gerke and Kaczynski 1972 F
 Hales 1981 R *
 Harris 1981 R *
 Hastings 1972 F *
 Heckman 1984 F *
 Heiser and Finn 1970 F *
 Johnson 1984a R *
 Millikan et al. 1974 F *
 Mock 1966 F *
 Mulvihill et al. 1980 R *
 Neill et al. 1983 L
 Orrell and Johnson 1975 F *
 Salo et al. 1980 F *
 Sawaragi and Kobune 1970 L *
 Simenstad et al. 1980 F *
 Starr et al. 1981 R
 Trent et al. 1976 F *
 U.S. Army Corps of Engineers 1981 R *
 U.S. Army Corps of Engineers 1985 F *
 Vilks et al. 1975 F
 Washington Dept. of Fisheries 1974 R

k. Increase in hydrostatic pressure or noise

Heiser and Finn 1970 F *

l. Change in level of dissolved oxygen, nitrogen

Anderson et al. 1981a F *
 Anderson et al. 1981b F *
 Anderson et al. 1981c F *
 Cardwell and Koons 1981 F *
 Cardwell et al. 1980a F *
 Cardwell et al. 1980b F *
 Carstea et al. 1975 R *
 Heiser and Finn 1970 F *
 Mulvihill et al. 1980 R *
 Nece et al. 1975 F *

m. Change in level of salinity

Bishop et al. 1983 R *
 Carstea et al. 1975 R *
 Clewell et al. 1976 F
 Craig and Griffiths 1981 F
 Drinkwater 1979 F *
 Elgershuizen 1981 F
 Hales 1981 R *

Hastings 1972 F *

Johnson 1984a R *

Miller and Currin 1981 F

Moles and Pella 1984 L

Mulvihill et al. 1980 R *

Nece et al. 1975 F *

U.S. Army Coastal Engr. Res. Ctr. 1977 R *

U.S. Army Corps of Engineers 1985 F *

Vilks et al. 1975 F

Washington Dept. of Fisheries 1971 R

n. Change in levels of heavy metals

Anderson et al. 1981a F *

Anderson et al. 1981b F *

Anderson et al. 1981c F *

Cardwell et al. 1980b F *

Carstea et al. 1975 R *

o. Change in levels of hydrocarbons

Carstea et al. 1975 R *

Dunn and Fee 1979 F *

Sigman 1985 R

Uthe et al. 1984 F *

p. Change in levels of nutrients

Borthwick and Patrick 1982 L *

Dunn and Fee 1979 F *

Mix et al. 1977 F *

Sigman 1985 R

Thomas and Rice 1982 L *

Uthe et al. 1984 F *

q. Introduction or removal of species

Anderson et al. 1981a F *

Anderson et al. 1981b F *

Anderson et al. 1981c F *

Cardwell et al. 1980b F *

Carstea et al. 1975 R *

Elgershuizen 1981 F

Heckman 1984 F *

Nece et al. 1975 F *

Trent et al. 1976 F *

r. Artificial attractant to biological organisms

Clewell et al. 1976 F

Lees et al. 1981 F *

Mulvihill et al. 1980 R *

Washington Dept. of Fisheries 1971 R

9. Filling (terrestrial):

- a. Removal or alteration of natural cover: riparian vegetation

Allen and Hardy 1980 R

10. Grading/plowing:

- a. Change in water temperature

Coutant 1976 R

Koski and Walter 1977 R *

- b. Change in turbidity or suspended sediments

Koski and Walter 1977 R *

O'Connor et al. 1976 L *

O'Connor et al. 1977 L

Stern and Stickle 1978 R

- c. Addition of substrate materials

Koski and Walter 1977 R *

O'Connor et al. 1976 L *

O'Connor et al. 1977 L

Smith 1978 L *

- d. Removal of substrate materials

O'Connor et al. 1976 L *

O'Connor et al. 1977 L

- e. Physical disturbance of substrate

Koski and Walter 1977 R *

O'Connor et al. 1976 L *

O'Connor et al. 1977 L

Smith 1978 L *

- f. Removal or alteration of natural cover: overhanging bank or shoreline

Koski and Walter 1977 R *

- g. Change in level of dissolved oxygen, nitrogen

Koski and Walter 1977 R *

O'Connor et al. 1976 L *

O'Connor et al. 1977 L

h. Change in levels of heavy metals

Bryan and Gibbs 1983 F

i. Introduction or removal of species

Koski and Walter 1977 R *

11. Human disturbance:

a. Removal or alteration of natural cover: aquatic vegetation

Beauchamp and Gowing 1982 F

b. Increase in hydrostatic pressure or noise

Banner and Hyatt 1973 L

Hawkins 1973 R

Heiser and Finn 1970 F *

Myrberg 1978 R

Olsen 1971 R

Schmiege 1980 R

c. Physical trampling or crushing

Beauchamp and Gowing 1982 F

d. Change in levels of heavy metals

Young et al. 1979 F

e. Artificial attractant to biological organisms

Beauchamp and Gowing 1982 F

12. Log storage/transport:

a. Change in turbidity or suspended sediments

Duval et al. 1980 R

Meyers 1977 F

b. Addition of substrate materials

Duval et al. 1980 R
 Ellis 1973 F
 Kathman et al. 1984 F
 Koski and Walter 1977 R *
 McDaniel 1973 F
 McGreer et al. 1984 F
 Meyers 1977 F
 O'Clair 1983 F
 Pease 1974 R
 Schaumburg 1973 F
 Schultz and Berg 1976 F
 Sedlak 1982 R

c. Physical disturbance of substrate

Duval et al. 1980 R
 Edgell and Ross 1983 R
 Ellis 1973 F
 Koski and Walter 1977 R *
 McGreer et al. 1984 F
 Meyers 1977 F
 O'Clair 1983 F
 Pacific N.W. Poll. Control Council 1971 R
 Pease 1974 R
 Sedlak 1982 R
 Sibert and Harpham 1979 F
 U.S. Environmental Protection Agency 1975a R

d. Addition of physical barriers: partial obstructions

Sibert and Harpham 1979 F

e. Change in level of dissolved oxygen, nitrogen

Duval et al. 1980 R
 Edgell and Ross 1983 R
 Koski and Walter 1977 R *
 McGreer et al. 1984 F
 Pease 1974 R
 Schaumburg 1973 F
 Schultz and Berg 1976 F
 Sedlak 1982 R
 Sibert and Harpham 1979 F
 U.S. Environmental Protection Agency 1975a R

f. Change in levels of other toxins--bark or log leachates

Buchanan et al. 1976 L *
 Duval et al. 1980 R

Edgell and Ross 1983 R
 Ellis 1973 F
 Graham and Schaumburg 1969 F *
 Koski and Walter 1977 R *
 Meyers 1977 F
 O'Clair 1983 F
 Pacific N.W. Poll. Control Council 1971 R
 Pease 1974 R
 Schaumburg 1973 F
 Schultz and Berg 1976 F
 Sedlak 1982 R
 U.S. Environmental Protection Agency 1975a R

g. Change in levels of other toxins--other

Duval et al. 1980 R

h. Change in levels of hydrocarbons

Koski and Walter 1977 R *

i. Introduction or removal of species

Schaumburg 1973 F

13. Netting:

a. Increase in hydrostatic pressure or noise

Hawkins 1973 R

b. Impingement or entrainment or entanglement

DeGange and Newby 1980 F

14. Processing geothermal energy:

a. Change in water temperature

Coutant 1976 R

b. Change in level of dissolved oxygen, nitrogen

Coutant 1976 R

15. Processing lumber/kraft/pulp:

a. Change in water temperature

- Coutant 1976 R
- b. Change in turbidity or suspended sediments
 - Parker and Sibert 1973 F
- c. Addition of substrate materials
 - Kathman et al. 1984 F
 - Schmiege 1980 R
- d. Change in level of dissolved oxygen, nitrogen
 - Coutant 1976 R
 - Parker and Sibert 1973 F
 - Schmiege 1980 R
 - Wildish et al. 1979 F
- e. Change in levels of pH, alkalinity, or hardness
 - McLeay et al. 1979 L
- f. Change in level of salinity
 - Greer and Kosakoski 1978 L
- g. Change in levels of chlorinated compounds
 - Koski and Walter 1977 R *
- h. Change in levels of other toxins--bark or log leachates
 - Schmiege 1980 R
- i. Change in levels of other toxins--other
 - Greer 1976 F
- j. Change in levels of hydrocarbons
 - Czyzewska 1976 L
 - Gordon and Servizi 1974 F
 - Greer 1976 F
 - McLeay et al. 1979 L
 - Schmiege 1980 R

16. Processing minerals:

- a. Change in water temperature

Coutant 1976 R

b. Addition of substrate materials

Smith 1978 L *

c. Physical disturbance of substrate

Smith 1978 L *

d. Change in level of dissolved oxygen, nitrogen

Coutant 1976 R

e. Change in levels of heavy metals

Bias 1981 F

Bryan and Gibbs 1983 F

Burrell and Welhs 1983 L

Harbo and Birtwell 1978 L

McIntyre 1979 L

Perttila et al. 1982 F

Thompson and Paton 1976 L

f. Introduction or removal of species

McIntyre 1979 L

17. Processing oil/gas:

a. Change in water temperature

Coutant 1976 R

b. Change in level of dissolved oxygen, nitrogen

Coutant 1976 R

c. Change in levels of heavy metals

Malins et al. 1980 F

d. Change in levels of chlorinated compounds

Malins et al. 1980 F

e. Change in levels of hydrocarbons

Bourne et al. 1981 L

Malins et al. 1980 F

f. Change in levels of nutrients

Babcock 1985 L
Bourne et al. 1981 L
Dunn and Young 1976 F
Long 1982 R
Malins et al. 1980 F
Mix et al. 1977 F *
Ordzie and Garofalo 1981 L
Starr et al. 1981 R

18. Sewage disposal:

a. Change in water temperature

Coutant 1976 R
Dwyer and Kramer 1975 L
Otte and Levings 1975 F
Sayce and Tufts 1972 L
Stober et al. 1980 L

b. Change in turbidity or suspended sediments

Lehmann 1975 R
Read et al. 1983 F

c. Addition of substrate materials

Read et al. 1983 F

d. Change in level of dissolved oxygen, nitrogen

Coutant 1976 R
Evelyn 1972 F
Lehmann 1975 R
McIntyre and Johnston 1975 F
Otte and Levings 1975 F
Rozengurt and Herz 1981 R
Tsai 1975 R

e. Change in levels of pH, alkalinity, or hardness

Otte and Levings 1975 F

f. Change in level of salinity

Otte and Levings 1975 F

g. Change in levels of heavy metals

Harbo and Birtwell 1978 L
 Lehmann 1975 R
 Long 1982 R
 Malins et al. 1980 F
 McIntyre 1979 L
 Servizi et al. 1978 L

h. Change in levels of chlorinated compounds

Davis and Middaugh 1975 R
 Erickson and Foulk 1980 L
 Lehmann 1975 R
 Long 1982 R
 Malins et al. 1980 F
 Martens and Servizi 1975 L
 Servizi and Martens 1974 F
 Servizi et al. 1978 L
 Stober et al. 1980 L
 Tsai 1975 R

i. Change in levels of other toxins--other

Read et al. 1983 F
 Tsai 1975 R

j. Change in levels of hydrocarbons

Czyzewska 1976 L
 Gordon and Servizi 1974 F
 Malins et al. 1980 F
 McNulty 1970 F
 Servizi et al. 1978 L
 Tsai 1975 R

k. Change in levels of nutrients

Malins et al. 1980 F

l. Introduction or removal of species

Evelyn 1972 F
 Jenkins 1978 F
 Lehmann 1975 R
 McIntyre 1979 L
 McIntyre and Johnston 1975 F
 McNulty 1970 F
 Read et al. 1983 F
 Rozengurt and Herz 1981 R

m. Artificial attractant to biological organisms

McIntyre and Johnston 1975 F

19. Solid waste disposal:

a. Change in turbidity or suspended sediments

Anderson et al. 1981a F *
Anderson et al. 1981b F *
Anderson et al. 1981c F *
Bernard 1976 R
Beyer et al. 1975 F
Brickell and Goering 1971 F
Burks and Engler 1978 F *
Champ et al. 1981 R
Fisheries Research Institute 1971 F
Hirsch et al. 1978 F
Johnston and Wildish 1981 L
Lees and Houghton 1980 F
Lehmann 1975 R
Malick et al. 1971 F
Morton 1977 R
NOAA 1980 F
Norton et al. 1981 F
O'Connor et al. 1976 L *
O'Connor et al. 1977 L
Peddicord and McFarland 1976 L
Peddicord and McFarland 1978 L
Pequegnat et al. 1978
Sherk et al. 1976 L
Stern and Stickle 1978 R
U.S. Environmental Protection Agency 1974 R
Wright 1978 F

b. Addition of substrate materials

Allen and Hardy 1980 R
Anderson et al. 1981a F *
Anderson et al. 1981b F *
Anderson et al. 1981c F *
Bechtel 1979 F
Bernard 1976 R
Brannon 1978 R
Brickell and Goering 1971 F
Burks and Engler 1978 F *
Champ et al. 1981 R
Chang and Levings 1976 L
Cronin et al. 1971 R *
Eagle et al. 1978 F
Eagle et al. 1979 F
Elner and Hamet 1984 F

Feder and Burrell 1982 F
 Fisheries Research Institute 1971 F
 Hirsch et al. 1978 F
 Johnston and Wildish 1981 L
 Karna 1978 F
 Lees and Houghton 1980 F
 Malick et al. 1971 F
 McDaniel 1973 F
 McDaniel et al. 1976 F
 Messieh et al. 1981 F
 Morton 1977 R
 NOAA 1980 F
 O'Connor et al. 1977 L
 Peddicord and McFarland 1976 L
 Peddicord and McFarland 1978 L
 Pequegnat et al. 1978
 Sherk et al. 1976 L
 Stewart and Tangerone 1977 F
 U.S. Environmental Protection Agency 1974 R
 Wright 1978 F

c. Removal of substrate materials

O'Connor et al. 1976 L *

d. Physical disturbance of substrate

Allen and Hardy 1980 R
 Anderson et al. 1981a F *
 Anderson et al. 1981b F *
 Anderson et al. 1981c F *
 Brannon 1978 R
 Hirsch et al. 1978 F
 O'Connor et al. 1976 L *
 O'Connor et al. 1977 L
 Peddicord and McFarland 1976 L
 Peddicord and McFarland 1978 L

e. Addition of physical barriers: diversions

Cronin et al. 1971 R *

f. Addition of physical barriers: partial obstructions

Cronin et al. 1971 R *

g. Change in level of dissolved oxygen, nitrogen

Bechtel 1979 F
 Bernard 1976 R

Beyer et al. 1975 F
 Brannon 1978 R
 Brickell and Goering 1971 F
 Burks and Engler 1978 F *
 Champ et al. 1981 R
 Feder and Burrell 1982 F
 Fisheries Research Institute 1971 F
 Lees et al. 1981 F *
 Lehmann 1975 R
 Malick et al. 1971 F
 Morton 1977 R
 O'Connor et al. 1976 L *
 O'Connor et al. 1977 L
 Pratt et al. 1973 F
 Stewart and Tangerone 1977 F
 U.S. Environmental Protection Agency 1974 R

h. Change in levels of pH, alkalinity, or hardness

Beyer et al. 1975 F

i. Change in levels of heavy metals

Bernard 1976 R
 Bias 1981 F
 Burks and Engler 1978 F *
 Castilla and Nealler 1978 F
 Eagle et al. 1978 F
 Hirsch et al. 1978 F
 Hoff et al. 1982 L
 Lehmann 1975 R
 Morton 1977 R
 Murray and Norton 1982 F
 Norton et al. 1981 F
 Peddicord and McFarland 1978 L
 Pequegnat et al. 1978
 Perttila et al. 1982 F
 Stern and Stickle 1978 R
 Wright 1978 F

j. Change in levels of chlorinated compounds

Brannon 1978 R
 Burks and Engler 1978 F *
 Lehmann 1975 R
 Peddicord and McFarland 1978 L
 Wright 1978 F

k. Introduction of biocides

Brannon 1978 R

Burks and Engler 1978 F *
Murray and Norton 1982 F
Stern and Stickle 1978 R
Wright 1978 F

l. Change in levels of other toxins--other

Karna 1978 F
Pratt et al. 1973 F

m. Change in levels of hydrocarbons

Burks and Engler 1978 F *
Hirsch et al. 1978 F
Murray and Norton 1982 F
Wright 1978 F

n. Change in levels of nutrients

Burks and Engler 1978 F *
Hirsch et al. 1978 F
Morton 1977 R
Pequegnat et al. 1978

o. Introduction or removal of species

Bechtel 1979 F
Brickell and Goering 1971 F
Burks and Engler 1978 F *
Champ et al. 1981 R
Eagle et al. 1978 F
Lehmann 1975 R
Malick et al. 1971 F
Morton 1977 R
Stern and Stickle 1978 R
Stewart and Tangerone 1977 F

p. Artificial attractant to biological organisms

Wright 1978 F

20. Stream crossing - structures:

a. Change in depth or velocity of water

Miller and Currin 1981 F

b. Change in level of salinity

Miller and Currin 1981 F

21. Transport of oil/gas/water - land:

a. Change in levels of nutrients

Mix et al. 1977 F *

22. Transport of oil/gas/water - water:

a. Change in water temperature

Korn et al. 1979 L
Linden 1978 L
Varanasi et al. 1981 L

b. Increase in hydrostatic pressure or noise

Banner and Hyatt 1973 L
Myrberg 1978 R
Olsen 1971 R

c. Change in level of salinity

Baden 1982 L
Stickle et al. 1982 L

d. Change in levels of hydrocarbons

Bourne et al. 1981 L
Czyzewska 1976 L

e. Change in levels of nutrients

Atlas et al. 1978 L
Babcock 1985 L
Baden 1982 L
Battershill and Bergquist 1982 F
Blanchard 1981 F
Bonsdorff 1981 F
Boucher 1985 F
Bourne et al. 1981 L
Brodersen et al. 1977 L
Cabioch et al. 1981 R
Cameron and Smith 1980 L
Canevari and Lindblom 1976 R
Chasse 1981 F
Collodi et al. 1984 L
Conan and Friha 1981 F
Crothers 1983 F
Desaunay 1981 F
Dunn and Young 1976 F

Edwards 1978 L
 Feder et al. 1976 F
 Fletcher et al. 1981 L
 Floc'h and Diouris 1981 F
 Franklin and Lloyd 1982 L
 Friocourt et al. 1981 F
 Griffiths et al. 1982 L
 Griswold 1981 F
 Grose and Mattson 1977 F
 Gundlach et al. 1983 F
 Hartwick et al. 1982 F
 Hsiao 1978 L
 Hsiao et al. 1978 L
 Johansson et al. 1980 F
 Kaas 1981 F
 Karinen 1980 R
 Kineman et al. 1980 R
 Korn and Rice 1981 L
 Korn et al. 1979 L
 Korn et al., in press L
 Laseter et al. 1981 F
 Le Moal and Quillien-Monot 1981 F
 Leglise and Raguene 1981 F
 Linden 1978 L
 Long 1982 R
 Lonning and Hagstrom 1976 L
 Lopez et al. 1981 F
 Malins 1977 F
 Malins and Hodgins 1981 R
 Malins et al. 1981 L
 McKeown 1981 L
 Mecklenburg et al. 1977 L
 Miossec 1981 F
 Mix et al. 1977 F *
 Moles 1980 L
 Moles and Rice 1983 L
 Moles et al. 1979 L
 Moles et al. 1981 L
 Neff and Anderson 1981 R
 Norton and Franklin 1980 F
 O'Clair and Rice 1985 L
 Olla and Bejda 1983 L
 Ordzie and Garofalo 1981 L
 Percy 1976 F
 Rice 1981 R
 Rice et al. 1975 L
 Rice et al. 1976a L
 Rice et al. 1976b L
 Rice et al. 1977a L
 Rice et al. 1977b L
 Rice et al. 1979 L

Rice et al. 1981 L
 Rice et al. 1984 R
 Sekerah and Foy 1978 L
 Shaw 1984 R
 Shaw et al. 1981 L
 Sprague et al. 1982 R
 Starr et al. 1981 R
 Stickle et al. 1982 L
 Stickle et al. 1984 L
 Taylor and Karinen 1977 L
 Thomas and Rice 1975 L
 Thomas and Rice 1979 L
 Thomas and Rice 1981 L
 Thomas and Rice 1982 L *
 Thomas and Rice, in press L
 Topinka and Tucker 1981 F
 Varanasi et al. 1981 L
 Wilson 1974 L
 Wilson 1976 L
 Wilson 1977 L

23. Transport of personnel/equipment/material - land:

a. Change in levels of nutrients

Mix et al. 1977 F *
 Rice 1981 R

24. Transport of personnel/equipment/material - water:

a. Increase in hydrostatic pressure or noise

Banner and Hyatt 1973 L
 Heiser and Finn 1970 F *
 Myrberg 1978 R
 Olsen 1971 R

b. Change in levels of heavy metals

Young et al. 1979 F

c. Change in levels of nutrients

Bourne et al. 1981 L
 Long 1982 R
 Mix et al. 1977 F *

25. Water regulation/withdrawal/irrigation:

- a. Change in water temperature
 - Dwyer and Kramer 1975 L
 - Hurley and Woodall 1968 F
- b. Change in turbidity or suspended sediments
 - Rozengurt and Herz 1981 R
- c. Addition of physical barriers: impoundments
 - Cronin et al. 1971 R *
- d. Increase in hydrostatic pressure or noise
 - Bishai 1961 L
- e. Impingement or entrainment or entanglement
 - Goldman and Quinby 1979 F
 - Starr et al. 1981 R
- f. Change in level of dissolved oxygen, nitrogen
 - Rozengurt and Herz 1981 R
- g. Change in level of salinity
 - Cronin et al. 1971 R *
 - Hurley and Woodall 1968 F
 - Rozengurt and Herz 1981 R
- h. Change in levels of chlorinated compounds
 - Goldman and Quinby 1979 F

Freshwater Fish

This section provides citations pertaining to impacts on freshwater fish or their habitats. Table 3 is a summary of the activities and impacts for which documentation was located. Activities for which documentation has been located are listed in the same order as they are found in table 3. Users should note that no documentation reported for some activity/impact categories may reflect either a real absence of research pertaining to that topic or a lack of completeness of this database, and does not necessarily imply that the activity does not result in adverse impacts to aquatic resources. Activities for which no documentation was located are as follows:

- Fencing
- Filling (terrestrial)
- Netting
- Transport of personnel/equipment/material - air
- Transport of personnel/equipment/material - water

Table 3. Summary of the Literature for Defined Activity/Impact Categories: Freshwater Fish

Impact	Activity																			
	Blasting	Burning	Channelizing waterways	Chemical application	Clearing and tree harvest	Draining	Dredging	Drilling	Fencing	Filling (aquatic and wetland habitats)	Filling (terrestrial)	Grading/plowing	Grazing	Human disturbance	Log storage/transport	Metting	Processing geothermal energy	Processing lumber/kraft/pulp	Processing minerals	Processing oil/gas
Change in water temperature	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Change in depth or velocity of water	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Change in turbidity or suspended sediments	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Addition of substrate materials	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Removal of substrate materials	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Physical disturbance of substrate materials	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Alteration of natural cover:																				
Riparian vegetation	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Aquatic vegetation	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Overhanging bank or shoreline	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Addition of physical barriers:																				
Impoundments	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Diversions	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Partial obstructions	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Other	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Increase in hydrostatic pressure or noise	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Impingement or entrapment or entanglement	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Physical trampling or crushing	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Change in level of dissolved oxygen, nitrogen	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Change in levels of pH, alkalinity, or hardness	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Change in level of salinity	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Change in levels of heavy metals	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Change in levels of chlorinated compounds	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Introduction of biocides	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Change in levels of other toxic compounds:																				
Bark or log leachates	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Sulfurous compounds	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Other	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Change in levels of hydrocarbons	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Change in levels of nutrients	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Introduction or removal of species	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Artificial attractant to biological organisms	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X

X - Documented impact

1. Blasting:

a. Increase in hydrostatic pressure or noise

Falk and Lawrence 1973 F
Jensen and Alderdice 1983 L

2. Burning:

a. Change in water temperature

Everest and Harr 1982 R *
Gibbons and Salo 1973 R *
Tiedemann et al. 1979 R

b. Change in depth or velocity of water

Everest and Harr 1982 R *
Gibbons and Salo 1973 R *
Lutz 1956 R
Megahan and Molitor 1975 F
Rice et al. 1972 R *
Viereck and Schandelmeir 1980 R
Wright 1981 R

c. Change in turbidity or suspended sediments

Everest and Harr 1982 R *
Lyon et al. 1978 R
Rice et al. 1972 R *
Stednick et al. 1982 F
Tiedemann et al. 1979 R
Viereck and Dyrness 1979 F
Viereck and Schandelmeir 1980 R

d. Addition of substrate materials

Brown (G.W.) and Krygier 1971 F *
Everest and Harr 1982 R *
Megahan and Molitor 1975 F

e. Physical disturbance of substrate

Brown (G.W.) and Krygier 1971 F *
Everest and Harr 1982 R *
Lutz 1956 R
Megahan and Molitor 1975 F
Rice et al. 1972 R *
Swanston 1971 R *
Swindel et al. 1983 F

f. Removal or alteration of natural cover: riparian

vegetation

Everest and Harr 1982 R *

Lutz 1956 R

Tiedemann et al. 1979 R

Viereck 1983 F

Viereck and Schandelmair 1980 R

g. Introduction or removal of species

Brown (G.W.) et al. 1973 F

Everest and Harr 1982 R *

Feller and Kimmins 1984 F *

Gibbons and Salo 1973 R *

Lutz 1956 R

Stednick et al. 1982 F

Tiedemann et al. 1979 R

Viereck 1983 F

Viereck and Schandelmair 1980 R

Wright 1981 R

3. Channelizing waterways:

a. Change in water temperature

Anderson and Broekstra 1977 F

Darnell et al. 1976 R

Hansen 1971 F *

Hansen and Muncy 1971 F

Hathaway 1978 F *

Hendrick 1976 F

Henegar and Harmon 1971 R

Hill 1976 R

Huish and Pardue 1978 F

Karr and Schlosser 1977 R *

Little 1973a R

Little 1973b R *

Lund 1976 F *

Mecum 1984 F *

Norton et al. 1978 F *

O'Rear 1975 F *

Parrish et al. 1978 R *

Platts and Rinne 1985 R

Schmal and Sanders 1978 F *

Shields 1982 R

Shields and Palermo 1982 R

Simpson et al. 1982 R *

Stern and Stern 1980a R

Stern and Stern 1980b R

Stoeckeler and Voskuil 1959 F

Swales 1982 R
 Tarplee et al. 1971 F *
 Thackston and Sneed 1982 R
 White 1973 R
 White and Brynildson 1967 R

b. Change in depth or velocity of water

Antoine and Benson-Evans 1982 F
 Babcock 1982 F
 Baldes 1973 F *
 Barstow 1971 F *
 Barton and Winger 1973 F
 Beland 1953 F *
 Bell 1986 R
 Benson and Weithman 1980 R
 Bianchi and Marcoux 1976 F
 Bottom et al. 1985 R *
 Bradt and Wieland 1978 F
 Brown (R.J.) and Baker 1975 R *
 Bulkley 1976 F *
 Bulkley et al. 1976 R
 Campbell et al. 1972 F *
 Caplice 1959 F
 Carline and Klosiewski 1985 F
 Cederholm 1972 F *
 Cederholm and Koski 1977 F *
 Choate 1972 F *
 Chutter 1969 R *
 Congdon 1971 F *
 Cooper and Wesche 1976 R
 Darnell et al. 1976 R
 Dodge et al. 1976 F
 Duval et al. 1976 F *
 Edwards 1977 F
 Edwards et al. 1984 F
 Elliott 1980 F *
 Elser 1968 F *
 Emerson 1971 F *
 Etnier 1972 F *
 Golden and Twilley 1976 F
 Griswold et al. 1978 F
 Groen and Schmulbach 1978 F *
 Hansen 1971 F *
 Hansen and Muncy 1971 F
 Hasfurther 1985 R *
 Hendrick 1976 F
 Henegar and Harmon 1971 R
 Hill 1976 R
 Huggins and Moss 1975 F
 Huish and Pardue 1978 F

Hunt and Graham 1972 F
 Irizarry 1969 F
 Johnson et al. 1974 F
 Keefer 1977 F *
 Kelly 1975 F
 Kuenzler et al. 1977 F *
 Little 1973a R
 Little 1973b R *
 Luedtke et al. 1976 F
 Lund 1976 F *
 McMahon et al. 1972 F *
 Mecum 1984 F *
 Menzel and Fierstine 1976 F
 Morris et al. 1968 F *
 Moyle 1976 F *
 Norton et al. 1978 F *
 Nunnally 1978 R
 Parrish et al. 1978 R *
 Peters and Alvord 1964 R
 Platts and Rinne 1985 R
 Ritter 1979 F
 Schlosser 1982 F
 Schoof 1980 R
 Shields 1982 R
 Shields and Palermo 1982 R
 Simpson et al. 1982 R *
 Stern and Stern 1980a R
 Stern and Stern 1980b R
 Swales 1982 R
 Swales and O'Hara 1980 R
 Tarplee et al. 1971 F *
 Thackston and Sneed 1982 R
 Trautman and Gartman 1974 F *
 U.S. Dept. of Transportation 1979 R
 USFWS 1980 R
 Wesche 1985 R *
 White 1973 R
 White and Brynildson 1967 R
 Winger 1972 F
 Witten and Bulkley 1975 F
 Wolf et al. 1972 F *
 Woods 1977 F
 Wydoski 1978 R
 Wydoski and Helm 1980 F
 Yearke 1971 F *
 Zimmer and Bachmann 1976 F
 Zimmer and Bachmann 1978 F *
 Zimmerman et al. 1967 F

c. Change in turbidity or suspended sediments

Arner et al. 1976 F *
 Babcock 1982 F
 Barclay 1980 F *
 Barton and Winger 1973 F
 Beland 1953 F *
 Bell 1986 R
 Bradt and Wieland 1978 F
 Brown (R.J.) and Baker 1975 R *
 Caplice 1959 F
 Chapman and Knudsen 1980 F *
 Cordone and Kelly 1961 R
 Darnell et al. 1976 R
 Dept. of Envir. Dept. of Fish. and Oceans 1983 R
 Hall and McKay 1983 R *
 Hansen 1971 F *
 Hansen and Muncy 1971 F
 Hasfurther 1985 R *
 Henegar and Harmon 1971 R
 Hill 1976 R
 Irizarry 1969 F
 Karr and Schlosser 1977 R *
 Kelly 1975 F
 Kuenzler et al. 1977 F *
 Little 1973a R
 Little 1973b R *
 Lloyd 1985 R *
 Luedtke et al. 1976 F
 Lund 1976 F *
 Mecum 1984 F *
 Parrish et al. 1978 R *
 Phillips 1971 R *
 Rees 1959 F *
 Reger and Helm 1982 F
 Ritter 1979 F
 Schmal and Sanders 1978 F *
 Shields 1982 R
 Shields and Palermo 1982 R
 Sigler et al. 1984 L *
 Simpson et al. 1982 R *
 Stern and Stern 1980a R
 Stern and Stern 1980b R
 Tarplee et al. 1971 F *
 Thackston and Sneed 1982 R
 Trautman and Gartman 1974 F *
 Whitaker et al. 1979 F *
 White 1973 R
 Winger 1972 F
 Wydoski 1978 R

d. Addition of substrate materials

Babcock 1982 F
 Baldes 1973 F *
 Barclay 1980 F *
 Barstow 1971 F *
 Barton and Winger 1973 F
 Beland 1953 F *
 Benson and Weithman 1980 R
 Bradt and Wieland 1978 F
 Cederholm 1972 F *
 Cederholm and Koski 1977 F *
 Chutter 1969 R *
 Cordone and Kelly 1961 R
 Elliott 1980 F *
 Emerson 1971 F *
 Griswold et al. 1978 F
 Hall and McKay 1983 R *
 Hansen and Muncy 1971 F
 Henegar and Harmon 1971 R
 Hill 1976 R
 Huish and Pardue 1978 F
 Johnson et al. 1974 F
 Kelly 1975 F
 Little 1973a R
 Little 1973b R *
 Lund 1976 F *
 Nunnally 1978 R
 Phillips 1971 R *
 Phillips et al. 1975 L *
 Rees 1959 F *
 Reger and Helm 1982 F
 Ritter 1979 F
 Schmal and Sanders 1978 F *
 Schoof 1980 R
 Sheeter and Claire 1981 F
 Shields and Palermo 1982 R
 Simpson et al. 1982 R *
 Stern and Stern 1980a R
 Stern and Stern 1980b R
 Striffler 1960 R
 Swales 1982 R
 Tarplee et al. 1971 F *
 Thackston and Sneed 1982 R
 Timbol and Maciolek 1978 F *
 Trautman and Gartman 1974 F *
 White 1973 R
 White and Brynildson 1967 R
 Winger 1972 F
 Woods 1977 F
 Wydoski and Helm 1980 F
 Yearke 1971 F *

e. Removal of substrate materials

Benke et al. 1979 F *
Bottom et al. 1985 R *
Henegar and Harmon 1971 R
Rees 1959 F *
Reger and Helm 1982 F
Schoof 1980 R
Simpson et al. 1982 R *
Stern and Stern 1980a R
Stern and Stern 1980b R
Swales 1982 R

f. Physical disturbance of substrate

Barton and Winger 1973 F
Benke et al. 1979 F *
Bottom et al. 1985 R *
Bradt and Wieland 1978 F
Cederholm 1972 F *
Cederholm and Koski 1977 F *
Chutter 1969 R *
Cordone and Kelly 1961 R
Emerson 1971 F *
Etnier 1972 F *
Griswold et al. 1978 F
Hansen and Muncy 1971 F
Hasfurther 1985 R *
Henegar and Harmon 1971 R
Johnson et al. 1974 F
Kelly 1975 F
Little 1973a R
Little 1973b R *
Lund 1976 F *
Marzolf 1978 R
Nunnally 1978 R
Parrish et al. 1978 R *
Platts and Rinne 1985 R
Rees 1959 F *
Reger and Helm 1982 F
Schoof 1980 R
Shields 1982 R
Shields and Palermo 1982 R
Simpson et al. 1982 R *
Stern and Stern 1980a R
Stern and Stern 1980b R
Striffler 1960 R
Swales 1982 R
Thackston and Sneed 1982 R
U.S. Dept. of Transportation 1979 R
USFWS 1980 R

Wesche 1985 R *

Whitaker et al. 1979 F *

White 1973 R

Winger 1972 F

Wolf et al. 1972 F *

Wydoski 1978 R

Wydoski and Helm 1980 F

g. Removal or alteration of natural cover: riparian vegetation

Babcock 1982 F

Barton and Winger 1973 F

Beland 1953 F *

Bottom et al. 1985 R *

Boussu 1954 F *

Bradt and Wieland 1978 F

Bulkley et al. 1976 R

Chapman and Knudsen 1980 F *

Cowan and Oswood 1983 F

Elser 1968 F *

Hansen and Muncy 1971 F

Hasfurther 1985 R *

Hathaway 1978 F *

Henegar and Harmon 1971 R

Karr and Schlosser 1977 R *

King and Carlander 1976 F *

Little 1973a R

Little 1973b R *

Lund 1976 F *

McCrimmon and Kwain 1966 F *

Nunnally 1978 R

Platts and Rinne 1985 R

Saunders and Smith 1962 F

Schlosser 1982 F

Schoof 1980 R

Sheeter and Claire 1981 F

Shields 1982 R

Shields and Palermo 1982 R

Simpson et al. 1982 R *

Smith 1976 F

Striffler 1960 R

Swales and O'Hara 1980 R

Tarplee et al. 1971 F *

Timbol and Maciolek 1978 F *

U.S. Dept. of Transportation 1979 R

USFWS 1980 R

Wesche 1985 R *

Wesche et al. 1985 F

White 1973 R

White and Brynildson 1967 R

Whitney and Bailey 1959 F *
 Wiley and Dufek 1976 F *
 Winger 1972 F
 Woods 1977 F
 Wydoski and Helm 1980 F
 Zimmerman et al. 1967 F

h. Removal or alteration of natural cover: aquatic vegetation

Babcock 1982 F
 Benke et al. 1979 F *
 Bottom et al. 1985 R *
 Boussu 1954 F *
 Bulkley et al. 1976 R
 Hansen and Muncy 1971 F
 Hendrick 1976 F
 Henegar and Harmon 1971 R
 Keller and Swanson 1979 F
 Marzolf 1978 R
 McCrimmon and Kwain 1966 F *
 Saunders and Smith 1962 F
 Shields and Palermo 1982 R
 Swales 1982 R
 Swales and O'Hara 1980 R
 Tarplee et al. 1971 F *
 Wesche et al. 1985 F
 White 1973 R
 White and Brynildson 1967 R
 Wiley and Dufek 1976 F *

i. Removal or alteration of natural cover: overhanging bank or shoreline

Babcock 1982 F
 Bianchi and Marcoux 1976 F
 Bottom et al. 1985 R *
 Boussu 1954 F *
 Bradt and Wieland 1978 F
 Bulkley 1976 F *
 Bulkley et al. 1976 R
 Chapman and Knudsen 1980 F *
 Cooper and Wesche 1976 R
 Hasfurther 1985 R *
 Henegar and Harmon 1971 R
 Keller and Swanson 1979 F
 King and Carlander 1976 F *
 McCrimmon and Kwain 1966 F *
 Mecum 1984 F *
 Menzel and Fierstine 1976 F
 Saunders and Smith 1962 F

Shields and Palermo 1982 R
 Simpson et al. 1982 R *
 Swales and O'Hara 1980 R
 Tarplee et al. 1971 F *
 U.S. Dept. of Transportation 1979 R
 USFWS 1980 R
 Wesche 1985 R *
 Wesche et al. 1985 F
 White 1973 R
 White and Brynildson 1967 R
 Wiley and Dufek 1976 F *
 Zimmer and Bachmann 1976 F
 Zimmer and Bachmann 1978 F *
 Zimmerman et al. 1967 F

j. Addition of physical barriers: impoundments

Swales and O'Hara 1980 R

k. Addition of physical barriers: diversions

Cooper and Wesche 1976 R
 Elliott 1980 F *
 Hathaway 1978 F *
 Henegar and Harmon 1971 R

l. Addition of physical barriers: partial obstructions

Elliott 1982 F
 Hansen 1971 F *
 Timbol and Maciolek 1978 F *

m. Change in level of dissolved oxygen, nitrogen

Anderson and Broekstra 1977 F
 Bradt and Wieland 1978 F
 Darnell et al. 1976 R
 Hall and McKay 1983 R *
 Hathaway 1978 F *
 Huish and Pardue 1978 F
 O'Rear 1975 F *
 Parrish et al. 1978 R *
 Phillips 1971 R *
 Stern and Stern 1980a R
 Stern and Stern 1980b R

n. Change in levels of pH, alkalinity, or hardness

Bradt and Wieland 1978 F
 Darnell et al. 1976 R

Hathaway 1978 F *
Norton et al. 1978 F *
Parrish et al. 1978 R *
Schmal and Sanders 1978 F *

o. Change in levels of heavy metals

O'Rear 1975 F *

p. Introduction of biocides

Darnell et al. 1976 R

q. Change in levels of hydrocarbons

Haywood 1983 R

r. Introduction or removal of species

Bradt and Wieland 1978 F
Karr and Schlosser 1977 R *
O'Rear 1975 F *
Shields 1982 R
Thackston and Sneed 1982 R

s. Artificial attractant to biological organisms

Arner et al. 1976 F *
Barclay 1980 F *
Benke et al. 1979 F *
Brown (R.J.) and Baker 1975 R *
Congdon 1971 F *
Edwards et al. 1984 F
Etnier 1972 F *
Golden and Twilley 1976 F
Hansen 1971 F *
Hathaway 1978 F *
Hendrick 1976 F
Henegar and Harmon 1971 R
Huggins and Moss 1975 F
McMahon et al. 1972 F *
Moyle 1976 F *
Reger and Helm 1982 F
Schlosser 1982 F
Schmal and Sanders 1978 F *
Schoof 1980 R
Timbol and Maciolek 1978 F *
Trautman and Gartman 1974 F *
Whitaker et al. 1979 F *
Wolf et al. 1972 F *
Woods 1977 F

Wydoski and Helm 1980 F

4. Chemical application:

a. Change in water temperature

Norris et al. 1983 R

b. Addition of substrate materials

Norris et al. 1983 R

c. Removal or alteration of natural cover: riparian vegetation

Norris et al. 1983 R

d. Change in levels of heavy metals

Bell 1986 R

e. Introduction of biocides

Bell 1986 R

Cederholm 1977 R *

Everest and Harr 1982 R *

Gibbons and Salo 1973 R *

Lorz et al. 1979 R

Martens et al. 1980 F

Meehan 1974 R *

Norris et al. 1983 R

Toews and Brownlee 1981 R *

f. Change in levels of other toxins--other

Blahm 1978 L

g. Change in levels of hydrocarbons

Bell 1986 R

Klaverkamp et al. 1976 L

h. Introduction or removal of species

Fredriksen et al. 1975 R *

Gibbons and Salo 1973 R *

Norris et al. 1983 R

5. Clearing and tree harvest:

a. Change in water temperature

Bachman 1958 F *
 Barrick 1984 F *
 Barton et al. 1985 F *
 Bell 1986 R
 Bottom et al. 1985 R *
 Brazier and Brown 1973 F *
 Brett et al. 1982 L
 Brown (G.W.) 1972 R *
 Brown (G.W.) and Krygier 1970 F *
 Burns 1972 F *
 Bustard and Narver 1975b F
 Cederholm 1977 R *
 Chamberlin 1982 R *
 Corbett et al. 1978 R *
 Dryden and Stein 1975 R *
 Elliott 1986 R *
 Gibbons and Salo 1973 R *
 Graynoth 1979 F *
 Hall and Lantz 1969 F *
 Harris 1973 F *
 Harris 1977 F *
 Hartman and Holtby 1982 R
 Hartman and Leahy 1983 F
 Hartman et al. 1982 F *
 Hartman et al. 1983 R *
 Hartman et al. 1984 F *
 Heming 1982 L *
 Heming et al. 1982 L *
 Holtby and Hartman 1982 F *
 Karr and Schlosser 1977 R *
 Koski and Walter 1977 R *
 Lantz 1971b R
 Meehan 1974 R *
 Murphy 1985 F
 Narver 1971 R *
 Narver 1972 F *
 Oregon Wildlife Commission 1974 *
 R and M Consultants 1977 R *
 Reiser and Bjornn 1979 R *
 Ringler and Hall 1975 F *
 Rishel et al. 1982 F *
 Ruth and Harris 1975 R *
 Schwan et al. 1985 R *
 Scrivener and Andersen 1984 F *
 Servizi and Jensen 1977 L
 Silsbee and Larson 1983 F *
 Toews and Brownlee 1981 R *
 Tyler and Gibbons 1973 F *
 U.S. Environmental Protection Agency 1975b R *

USACRREL 1980 F *

b. Change in depth or velocity of water

Anderson 1971 R
Bachman 1958 F *
Beschta 1978 F *
Beschta 1979 F *
Bottom et al. 1985 R *
Brannon 1965 L
Burns 1972 F *
Bustard and Narver 1975b F
Cederholm 1977 R *
Chamberlin 1982 R *
Chutter 1969 R *
Elliott 1986 R *
Gibbons and Salo 1973 R *
Harr and McCorison 1979 F
Harr et al. 1975 F
Harr et al. 1979 F *
Harr et al. 1982 F
Harris 1973 F *
Harris 1977 F *
Hartman and Holtby 1982 R
Hartman et al. 1982 F *
Hess 1984 F *
Holtby and Hartman 1982 F *
Hsieh 1970 F
Koski and Walter 1977 R *
Krygier and Harr 1972 F
Lull 1959 F *
Meehan 1974 R *
Moring 1982 F *
Myren and Ellis 1984 F *
Narver 1971 R *
Narver 1972 F *
Patric and Aubertin 1977 F
Patric and Gorman 1978 F
R and M Consultants 1977 R *
Rothacher 1970 F *
Ruth and Harris 1975 R *
Schwan et al. 1985 R *
Swindel et al. 1983 F
Toews and Brownlee 1981 R *
Tschaplinski and Hartman 1983 F *

c. Change in turbidity or suspended sediments

Adams and Beschta 1980 F
Aldrich and Johnson 1979 F *
Anderson 1971 R

Bachman 1958 F *
 Barrick 1984 F *
 Barton et al. 1985 F *
 Bartsch 1960 R *
 Bell 1986 R
 Beschta 1978 F *
 Beschta 1979 F *
 Beschta 1980 F
 Bjornn et al. 1974 F *
 Bjornn et al. 1977 F
 Brown (G.W.) 1972 R *
 Burns 1970 F *
 Burns 1972 F *
 Bustard and Narver 1975a F
 Bustard and Narver 1975b F
 Chamberlin 1982 R *
 Corbett et al. 1978 R *
 Cordone and Kelly 1961 R
 Crouse et al. 1981 F *
 Culp and Davies 1983 F *
 Cummins 1985 F *
 Dryden and Stein 1975 R *
 Fredriksen et al. 1975 R *
 Gibbons and Salo 1973 R *
 Gradall and Swenson 1982 L
 Hall and Lantz 1969 F *
 Hall and McKay 1983 R *
 Hartman and Holtby 1982 R
 Hartman et al. 1983 R *
 Hausle and Coble 1976 L
 Holtby and Hartman 1982 F *
 Karr and Schlosser 1977 R *
 Koski and Walter 1977 R *
 Koski et al. 1984 F *
 Kramer and Smith 1965 *
 Lantz 1971a R *
 Lloyd 1985 R *
 Lotspeich and Helmers 1974 R
 McCabe and O'Brien 1983 L
 McNeil and Ahnell 1964 F *
 Meehan 1974 R *
 Meehan and Swanston 1977 F
 Megahan and Kidd 1972 F *
 Murphy et al. 1981 F *
 Narver 1971 R *
 Newbold et al. 1980 F *
 Noggle 1978 L *
 Oregon Wildlife Commission 1974 *
 Patric and Aubertin 1977 F
 Phillips 1971 R *
 Platts and Megahan 1975 F *

R and M Consultants 1977 R *
 Reiser and Bjornn 1979 R *
 Rice et al. 1972 R *
 Ruth and Harris 1975 R *
 Schwan et al. 1985 R *
 Scrivener and Brownlee 1982 R *
 Sheridan and McNeil 1968 F
 Sigler et al. 1984 L *
 Silsbee and Larson 1983 F *
 Swanson and Lienkaemper No date R *
 Toews and Brownlee 1981 R *
 Toews and Moore 1982 F *
 U.S. Environmental Protection Agency 1975b R *
 U.S. Forest Service et al. 1976 F
 USACRREL 1980 F *
 Welch et al. 1977 F *
 Wilson 1960 R *
 Wydoski 1978 R

d. Addition of substrate materials

Anderson 1971 R
 Bachman 1958 F *
 Barton et al. 1985 F *
 Bartsch 1960 R *
 Beschta 1978 F *
 Bethlahmy 1967 F
 Bjornn et al. 1974 F *
 Bjornn et al. 1977 F
 Bottom et al. 1985 R *
 Brown (G.W.) 1972 R *
 Brown (G.W.) and Krygier 1971 F *
 Brusven and Prather 1974 L
 Burns 1970 F *
 Cederholm 1977 R *
 Chamberlin 1982 R *
 Chutter 1969 R *
 Cordone and Kelly 1961 R
 Crouse et al. 1981 F *
 Culp and Davies 1983 F *
 Elliott 1986 R *
 Fredriksen 1970 F *
 Gibbons and Salo 1973 R *
 Graynoth 1979 F *
 Hall and Lantz 1969 F *
 Hall and McKay 1983 R *
 Harris 1973 F *
 Harris 1977 F *
 Hartman and Holtby 1982 R
 Hartman et al. 1983 R *
 Holtby and Hartman 1982 F *

Koski and Walter 1977 R *
 Koski et al. 1984 F *
 Kramer and Smith 1965 *
 McNeil and Ahnell 1964 F *
 Meehan 1974 R *
 Meehan and Swanston 1977 F
 Meehan et al. 1985 R
 Megahan and Kidd 1972 F *
 Megahan and Molitor 1975 F
 Moring 1982 F *
 Murphy and Hall 1981 F *
 Narver 1971 R *
 Peterson and Metcalfe 1981 L
 Phillips 1971 R *
 Phillips et al. 1975 L *
 Platts and Megahan 1975 F *
 Ponce and Brown 1974 L *
 Reiser and Bjornn 1979 R *
 Rice et al. 1972 R *
 Ringler and Hall 1975 F *
 Ruth and Harris 1975 R *
 Schwan et al. 1985 R *
 Scrivener and Andersen 1984 F *
 Scrivener and Brownlee 1982 R *
 Sheridan and McNeil 1968 F
 Silsbee and Larson 1983 F *
 Swanson and Lienkaemper No date R *
 Swanston 1969 F *
 Swindel et al. 1983 F
 U.S. Environmental Protection Agency 1975b R *
 Welch et al. 1977 F *
 Wilson 1960 R *
 Wu and Swanston 1980 R *

e. Removal of substrate materials

Bjornn et al. 1977 F
 Rice et al. 1972 R *
 Ruth and Harris 1975 R *
 Swanston 1969 F *

f. Physical disturbance of substrate

Beschta 1978 F *
 Beschta 1979 F *
 Bethlahmy 1967 F
 Bjornn et al. 1977 F
 Bottom et al. 1985 R *
 Brown (G.W.) 1972 R *
 Brown (G.W.) and Krygier 1971 F *
 Burns 1970 F *

Cederholm 1977 R *
 Chamberlin 1982 R *
 Chutter 1969 R *
 Cordone and Kelly 1961 R
 Crouse et al. 1981 F *
 Fredriksen 1970 F *
 Froehlich 1979 F
 Gent et al. 1984 F
 Gibbons and Salo 1973 R *
 Graynoth 1979 F *
 Harris 1973 F *
 Harris 1977 F *
 Hartman et al. 1983 R *
 Koski and Walter 1977 R *
 Lantz 1971a R *
 Lull 1959 F *
 Meehan 1974 R *
 Megahan and Kidd 1972 F *
 Megahan and Molitor 1975 F
 Moring 1982 F *
 Murphy et al. 1981 F *
 Patric and Gorman 1978 F
 Ponce and Brown 1974 L *
 Rice et al. 1972 R *
 Ruth and Harris 1975 R *
 Silsbee and Larson 1983 F *
 Swanson and Dyrness 1975 F *
 Swanston 1969 F *
 Swanston 1970 F *
 Swanston 1971 R *
 Swindel et al. 1983 F
 U.S. Environmental Protection Agency 1975b R *
 U.S. Forest Service et al. 1976 F
 Welch et al. 1977 F *
 Wilson 1960 R *
 Wu and Swanston 1980 R *

g. Removal or alteration of natural cover: riparian vegetation

Aldrich and Johnson 1979 F *
 Barrick 1984 F *
 Barton et al. 1985 F *
 Bisson and Sedell 1984 F
 Bottom et al. 1985 R *
 Brown (G.W.) 1972 R *
 Brown (G.W.) and Krygier 1970 F *
 Bryant 1980 F *
 Bryant 1983 R *
 Burns 1972 F *
 Bustard and Narver 1975b F

Chamberlin 1982 R *
 Corbett et al. 1978 R *
 Cowan and Oswood 1983 F
 Culp and Davies 1983 F *
 Elliott 1986 R *
 Erman and Mahoney 1983 F *
 Erman et al. 1977 F *
 Gibbons and Salo 1973 R *
 Graynoth 1979 F *
 Hartman et al. 1983 R *
 Holtby and Hartman 1982 F *
 Karr and Schlosser 1977 R *
 Kochenderfer 1970 R
 Koski and Walter 1977 R *
 Koski et al. 1984 F *
 Lantz 1971a R *
 Lantz 1971b R
 Lotspeich and Helmers 1974 R
 Martin and Pierce 1980 F
 Meehan et al. 1985 R
 Moring 1982 F *
 Murphy and Hall 1981 F *
 Murphy et al. 1981 F *
 Narver 1971 R *
 Narver 1972 F *
 Oregon Wildlife Commission 1974 *
 Osborn 1980 F
 Reed and Elliott 1972 F *
 Reiser and Bjornn 1979 R *
 Ringler and Hall 1975 F *
 Rishel et al. 1982 F *
 Ruth and Harris 1975 R *
 Schwan et al. 1985 R *
 Smith 1976 F
 Swanson and Lienkaemper No date R *
 Toews and Brownlee 1981 R *
 Toews and Moore 1982 F *
 Tschapinski and Hartman 1983 F *
 U.S. Forest Service et al. 1976 F
 USACRREL 1980 F *
 Welch et al. 1977 F *

h. Removal or alteration of natural cover: aquatic vegetation

Barton et al. 1985 F *
 Bisson and Sedell 1984 F
 Bottom et al. 1985 R *
 Bryant 1980 F *
 Bryant 1983 R *
 Cederholm 1977 R *

Culp and Davies 1983 F *
 Hansmann and Phinney 1973 F *
 Hartman and Holtby 1982 R
 Holtby and Hartman 1982 F *
 Keller and Swanson 1979 F
 Lestelle and Cederholm 1984 F *
 Meehan 1974 R *
 Meehan et al. 1985 R
 Osborn 1980 F
 Reed and Elliott 1972 F *
 Reiser and Bjornn 1979 R *
 Schwan et al. 1985 R *
 Sheridan and McNeil 1968 F
 Silsbee and Larson 1983 F *
 Swanson and Dyrness 1975 F *
 Swanson and Lienkaemper No date R *
 Toews and Moore 1982 F *
 Tschaplinski and Hartman 1983 F *

i. Removal or alteration of natural cover:
overhanging bank or shoreline

Barrick 1984 F *
 Bisson and Sedell 1984 F
 Bryant 1980 F *
 Bustard and Narver 1975a F
 Chamberlin 1982 R *
 Elliott 1986 R *
 Hartman et al. 1983 R *
 Keller and Swanson 1979 F
 Lotspeich and Helmers 1974 R
 Narver 1971 R *
 Narver 1972 F *
 Osborn 1980 F
 Reed and Elliott 1972 F *
 Reiser and Bjornn 1979 R *
 Schwan et al. 1985 R *
 U.S. Forest Service et al. 1976 F
 Welch et al. 1977 F *

j. Addition of physical barriers: diversions

Dryden and Stein 1975 R *

k. Addition of physical barriers: partial
obstructions

Barrick 1984 F *
 Chamberlin 1982 R *
 Gibbons and Salo 1973 R *
 Lotspeich and Helmers 1974 R

Narver 1971 R *

Ruth and Harris 1975 R *

Schwan et al. 1985 R *

Swanson and Lienkaemper No date R *

Toews and Moore 1982 F *

l. Physical trampling or crushing

Lull 1959 F *

m. Change in level of dissolved oxygen, nitrogen

Barrick 1984 F *

Brannon 1965 L

Brown (G.W.) 1972 R *

Chamberlin 1982 R *

Gibbons and Salo 1973 R *

Graynoth 1979 F *

Hall and Lantz 1969 F *

Hall and McKay 1983 R *

Koski and Walter 1977 R *

Meehan 1974 R *

Murphy 1985 F

Narver 1971 R *

Oregon Wildlife Commission 1974 *

Phillips 1971 R *

Ponce and Brown 1974 L *

R and M Consultants 1977 R *

Reiser and Bjornn 1979 R *

Ringler and Hall 1975 F *

Scrivener and Brownlee 1982 R *

Shumway et al. 1964 F *

Wilson 1960 R *

n. Change in levels of pH, alkalinity, or hardness

Schwan et al. 1985 R *

Silsbee and Larson 1983 F *

o. Introduction of biocides

Koski and Walter 1977 R *

Rishel et al. 1982 F *

p. Change in levels of other toxins--bark or log leachates

Peters et al. 1976 L *

Schwan et al. 1985 R *

q. Change in levels of hydrocarbons

Rice and Bailey 1980 L

r. Introduction or removal of species

Brown (G.W.) 1972 R *

Brown (G.W.) et al. 1973 F

Chamberlin 1982 R *

Corbett et al. 1978 R *

Elliott 1986 R *

Feller and Kimmins 1984 F *

Hartman and Holtby 1982 R

Hartman et al. 1983 R *

Holtby and Hartman 1982 F *

Karr and Schlosser 1977 R *

Koski and Walter 1977 R *

Martin and Pierce 1980 F

Schwan et al. 1985 R *

Silsbee and Larson 1983 F *

Toews and Brownlee 1981 R *

s. Artificial attractant to biological organisms

Reed and Elliott 1972 F *

6. Draining:

a. Change in water temperature

Hill 1976 R

Little 1973a R

Little 1973b R *

USACRREL 1980 F *

b. Change in depth or velocity of water

Barstow 1971 F *

Beland 1953 F *

Campbell et al. 1972 F *

Choate 1972 F *

Hill 1976 R

Little 1973a R

Little 1973b R *

Trautman and Gartman 1974 F *

c. Change in turbidity or suspended sediments

Hill 1976 R

Little 1973a R

Little 1973b R *

Lotspeich and Helmers 1974 R

Noggie 1978 L *
Trautman and Gartman 1974 F *
USACRREL 1980 F *

d. Addition of substrate materials

Hill 1976 R
Little 1973a R
Little 1973b R *
Trautman and Gartman 1974 F *

e. Physical disturbance of substrate

Little 1973a R
Little 1973b R *

f. Removal or alteration of natural cover: riparian vegetation

Little 1973a R
Little 1973b R *
Lotspeich and Helmers 1974 R
USACRREL 1980 F *

g. Removal or alteration of natural cover: overhanging bank or shoreline

Lotspeich and Helmers 1974 R

h. Addition of physical barriers: diversions

Lotspeich and Helmers 1974 R

i. Addition of physical barriers: partial obstructions

Lotspeich and Helmers 1974 R

j. Introduction or removal of species

Hill 1976 R

7. Dredging:

a. Change in water temperature

ADF&G 1983 R
Caplice 1959 F
Darnell et al. 1976 R
Woodward-Clyde Consultants 1980 F

b. Change in depth or velocity of water

ADF&G 1983 R
Brown (R.J.) and Baker 1975 R *
Darnell et al. 1976 R
Woodward-Clyde Consultants 1980 F

c. Change in turbidity or suspended sediments

ADF&G 1983 R
Bell 1986 R
Birtwell et al. 1984 F
Bjornn et al. 1977 F
Bowden et al. 1983 R
Brown (R.J.) and Baker 1975 R *
Campbell 1954 F
Cordone and Kelly 1961 R
Darnell et al. 1976 R
Dept. of Envir. Dept. of Fish. and Oceans 1983 R
Gore and Johnson 1980 F
Gradall and Swenson 1982 L
Hall and McKay 1983 R *
Harvey et al. 1982 F
Hausle and Coble 1976 L
LaPerriere et al. 1983 F
Lloyd 1985 R *
Mathers et al. 1981 F
McCabe and O'Brien 1983 L
McLeay et al. 1983 F *
McLeay et al. 1984 L *
Meehan and Swanston 1977 F
Noggle 1978 L *
Pearson and Jones 1975 F *
Peddicord and McFarland 1978 L
Phillips 1971 R *
Redding and Schreck 1980 L *
Rees 1959 F *
Sigler et al. 1984 L *
Simmons 1984 F
Wagener 1984 F
Wilson 1960 R *
Woodward-Clyde Consultants 1980 F
Wydoski 1978 R

d. Addition of substrate materials

ADF&G 1983 R
Bartsch 1960 R *
Bjornn et al. 1977 F
Bowden et al. 1983 R
Brusven and Prather 1974 L

Campbell 1954 F
 Caplice 1959 F
 Cordone and Kelly 1961 R
 Hall and McKay 1983 R *
 Harvey et al. 1982 F
 Johnson 1984b R *
 LaPerriere et al. 1983 F
 Oregon St. Game Commission et al. 1955 F
 Pearson and Jones 1975 F *
 Phillips 1971 R *
 Phillips et al. 1975 L *
 Rees 1959 F *
 Shaw and Maga 1943 F
 Wagener 1984 F
 Wilson 1960 R *

e. Removal of substrate materials

Bjornn et al. 1977 F
 Bowden et al. 1983 R
 Brown (R.J.) and Baker 1975 R *
 Campbell 1954 F
 Caplice 1959 F
 Harvey et al. 1982 F
 McLeay et al. 1983 F *
 Meehan and Swanston 1977 F
 Peddicord and McFarland 1978 L
 Rees 1959 F *
 Wagener 1984 F

f. Physical disturbance of substrate

Bjornn et al. 1977 F
 Bowden et al. 1983 R
 Brown (R.J.) and Baker 1975 R *
 Campbell 1954 F
 Caplice 1959 F
 Cordone and Kelly 1961 R
 Gore and Johnson 1980 F
 Harvey et al. 1982 F
 Johnson 1984b R *
 Oregon St. Game Commission et al. 1955 F
 Peddicord and McFarland 1978 L
 Rees 1959 F *
 Shaw and Maga 1943 F
 Wagener 1984 F
 Wilson 1960 R *
 Woodward-Clyde Consultants 1980 F

g. Removal or alteration of natural cover: riparian vegetation

- Woodward-Clyde Consultants 1980 F
- h. Removal or alteration of natural cover:
overhanging bank or shoreline
- Woodward-Clyde Consultants 1980 F
- i. Addition of physical barriers: impoundments
- Woodward-Clyde Consultants 1980 F
- j. Addition of physical barriers: diversions
- Woodward-Clyde Consultants 1980 F
- k. Impingement or entrainment or entanglement
- Griffith and Andrews 1981 F
- l. Change in level of dissolved oxygen, nitrogen
- ADF&G 1983 R
Bartsch 1960 R *
Bowden et al. 1983 R
Darnell et al. 1976 R
Hall and McKay 1983 R *
Phillips 1971 R *
Shumway et al. 1964 F *
Wilson 1960 R *
Woodward-Clyde Consultants 1980 F
- m. Change in levels of pH, alkalinity, or hardness
- Darnell et al. 1976 R
LaPerriere et al. 1983 F
- n. Change in levels of heavy metals
- Bell 1986 R
Brown (E.J.) et al. 1982 F
LaPerriere et al. 1983 F
Martin 1983 F
Peddicord and McFarland 1978 L
Seelye et al. 1982 L *
Wagener 1984 F
- o. Change in levels of chlorinated compounds
- Peddicord and McFarland 1978 L
- p. Introduction of biocides

Darnell et al. 1976 R

q. Change in levels of hydrocarbons

Gore and Johnson 1980 F

Seelye et al. 1982 L *

8. Drilling:

a. Change in turbidity or suspended sediments

Alexander and Hansen 1977 F

Peddicord and McFarland 1978 L

Suter 1978

b. Addition of substrate materials

Alexander and Hansen 1977 F

Didiuk and Wright 1975 L

Peddicord and McFarland 1978 L

c. Physical disturbance of substrate

Peddicord and McFarland 1978 L

d. Change in levels of heavy metals

Peddicord and McFarland 1978 L

e. Change in levels of chlorinated compounds

Peddicord and McFarland 1978 L

f. Change in levels of nutrients

Rosenberg and Wiens 1976 F

9. Filling (aquatic and wetland habitats):

a. Change in water temperature

Moulton et al. 1985 F *

b. Change in depth or velocity of water

Barton and Winger 1973 F

Bottom et al. 1985 R *

Bulkley 1976 F *

Carline and Klosiewski 1985 F

Cooper and Wesche 1976 R
 Edwards 1977 F
 Edwards et al. 1984 F
 Elser 1968 F *
 Gore and Johnson 1980 F
 Johnson et al. 1974 F
 Luedtke et al. 1976 F
 Lund 1976 F *
 Mecum 1984 F *
 Nunnally 1978 R
 Peters and Alvord 1964 R
 Platts and Rinne 1985 R
 Saunders and Smith 1962 F
 Schoof 1980 R
 Sheeter and Claire 1981 F
 Striffler 1960 R
 Swales and O'Hara 1980 R
 U.S. Dept. of Transportation 1979 R
 Witten and Bulkley 1975 F
 Woods 1977 F

c. Change in turbidity or suspended sediments

Cordone and Kelly 1961 R
 Luedtke et al. 1976 F
 Moulton et al. 1985 F *

d. Addition of substrate materials

Cordone and Kelly 1961 R

e. Physical disturbance of substrate

Cordone and Kelly 1961 R

f. Removal or alteration of natural cover: riparian vegetation

Barrick 1984 F *

g. Removal or alteration of natural cover: aquatic vegetation

Moulton et al. 1985 F *

h. Removal or alteration of natural cover: overhanging bank or shoreline

Barrick 1984 F *

i. Change in levels of nutrients

Brown (V.M.) et al. 1969 L *

DeGraeve 1982 L *

Mitrovic et al. 1968 L *

Swift 1978 L *

j. Introduction or removal of species

Moulton et al. 1985 F *

10. Grading/plowing:

a. Change in water temperature

Bachman 1958 F *

Barton et al. 1985 F *

Bell 1986 R

Brazier and Brown 1973 F *

Brett et al. 1982 L

Burns 1972 F *

Bustard and Narver 1975b F

Chamberlin 1982 R *

Corbett et al. 1978 R *

Dryden and Stein 1975 R *

Elliott 1986 R *

Everest and Harr 1982 R *

Gibbons and Salo 1973 R *

Harris 1973 F *

Hartman and Holtby 1982 R

Hartman et al. 1983 R *

Heming et al. 1982 L *

Karr and Schlosser 1977 R *

Koski and Walter 1977 R *

Meehan 1974 R *

Narver 1972 F *

Oregon Wildlife Commission 1974 *

Reiser and Bjornn 1979 R *

Ringler and Hall 1975 F *

Ruth and Harris 1975 R *

Schwan et al. 1985 R *

Servizi and Jensen 1977 L

USACRREL 1980 F *

USFWS 1982 R

b. Change in depth or velocity of water

Anderson 1971 R

Bachman 1958 F *

Beschta 1978 F *

Beschta 1979 F *

Bottom et al. 1985 R *

Brannon 1965 L
 Burns 1972 F *
 Burroughs et al. 1972 F *
 Bustard and Narver 1975b F
 Chamberlin 1982 R *
 Chutter 1969 R *
 Cooper and Wesche 1976 R
 Elliott 1986 R *
 Everest and Harr 1982 R *
 Harr et al. 1975 F
 Harris 1973 F *
 Hartman and Holtby 1982 R
 Hess 1984 F *
 Hsieh 1970 F
 Irizarry 1969 F
 Koski and Walter 1977 R *
 Krygier and Harr 1972 F
 Meehan 1974 R *
 Megahan 1972 F *
 Narver 1972 F *
 Peters and Alvord 1964 R
 Ruth and Harris 1975 R *
 Schwan et al. 1985 R *
 Swindel et al. 1983 F
 USFWS 1982 R

c. Change in turbidity or suspended sediments

ADEC and R and M Consultants 1980 R *
 Adams and Beschta 1980 F
 Aldrich and Johnson 1979 F *
 Anderson 1971 R
 Bachman 1958 F *
 Barrick 1984 F *
 Barton 1977 F *
 Bell 1986 R
 Beschta 1978 F *
 Beschta 1979 F *
 Beschta 1980 F
 Bjornn et al. 1974 F *
 Bjornn et al. 1977 F
 Brown (G.W.) 1972 R *
 Burns 1970 F *
 Burns 1972 F *
 Burton et al. 1976 F
 Bustard and Narver 1975a F
 Bustard and Narver 1975b F
 Cederholm 1977 R *
 Cederholm et al. 1981 F *
 Chamberlin 1982 R *
 Cowen 1974 R *

Crouse et al. 1981 F *
 Culp and Davies 1983 F *
 Cummins 1985 F *
 Dept. of Envir. Dept. of Fish. and Oceans 1983 R
 Dryden and Stein 1975 R *
 Elliott 1986 R *
 Everest and Harr 1982 R *
 Fredriksen et al. 1975 R *
 Gibbons and Salo 1973 R *
 Gradall and Swenson 1982 L
 Hall and McKay 1983 R *
 Hartman and Holtby 1982 R
 Hartman et al. 1983 R *
 Hausle and Coble 1976 L
 Irizarry 1969 F
 Karr and Schlosser 1977 R *
 King and Ball 1964 F
 Kochenderfer 1970 R
 Koski and Walter 1977 R *
 Koski et al. 1984 F *
 LaPerriere et al. 1983 F
 Lantz 1971a R *
 Larse 1971 R *
 Leedy and Adams 1982 R
 Lenat et al. 1981 F *
 Lloyd 1985 R *
 Lotspeich 1971 R *
 Lotspeich and Helmers 1974 R
 McCabe and O'Brien 1983 L
 McLeay et al. 1983 F *
 McLeay et al. 1984 L *
 McNeil and Ahnell 1964 F *
 Meehan 1974 R *
 Meehan and Swanston 1977 F
 Megahan and Kidd 1972 F *
 Newbold et al. 1980 F *
 Noggle 1978 L *
 Oregon Wildlife Commission 1974 *
 Phillips 1971 R *
 Platts and Megahan 1975 F *
 R and M Consultants 1977 R *
 Redding and Schreck 1980 L *
 Reiser and Bjornn 1979 R *
 Rice et al. 1972 R *
 Rosenberg and Snow 1975 R *
 Ruth and Harris 1975 R *
 Saskatchewan Dept. of the Environ. 1981 R
 Schwan et al. 1985 R *
 Scrivener and Brownlee 1982 R *
 Sigler et al. 1984 L *
 Swanson and Lienkaemper No date R *

Thomas 1985 F
 Toews and Brownlee 1981 R *
 U.S. Environmental Protection Agency 1973 R *
 USACRREL 1980 F *
 USFWS 1982 R
 Wagener 1984 F
 Welch et al. 1977 F *
 Wilson 1960 R *
 Yee and Roelofs 1980 R *

d. Addition of substrate materials

ADEC and R and M Consultants 1980 R *
 Anderson 1971 R
 Bachman 1958 F *
 Bartsch 1960 R *
 Beschta 1978 F *
 Bjornn et al. 1974 F *
 Bjornn et al. 1977 F
 Bottom et al. 1985 R *
 Brown (G.W.) and Krygier 1971 F *
 Brusven and Prather 1974 L
 Burns 1970 F *
 Cederholm 1977 R *
 Cederholm et al. 1981 F *
 Chamberlin 1982 R *
 Chutter 1969 R *
 Cordone and Kelly 1961 R
 Crouse et al. 1981 F *
 Culp and Davies 1983 F *
 Elliott 1986 R *
 Everest and Harr 1982 R *
 Fredriksen 1970 F *
 Gibbons and Salo 1973 R *
 Hall and McKay 1983 R *
 Harris 1973 F *
 Hartman and Holtby 1982 R
 Hartman et al. 1983 R *
 King and Ball 1964 F
 Kochenderfer 1970 R
 Koski and Walter 1977 R *
 Koski et al. 1984 F *
 LaPerriere et al. 1983 F
 Lenat et al. 1981 F *
 McCashion and Rice 1983 F *
 McLeay et al. 1983 F *
 McNeil and Ahnell 1964 F *
 Meehan 1974 R *
 Meehan and Swanston 1977 F
 Megahan and Kidd 1972 F *
 Oregon St. Game Commission et al. 1955 F

Peterson and Metcalfe 1981 L
 Phillips 1971 R *
 Phillips et al. 1975 L *
 Platts and Megahan 1975 F *
 Reiser and Bjornn 1979 R *
 Ringler and Hall 1975 F *
 Rosenberg and Snow 1975 R *
 Ruth and Harris 1975 R *
 Saskatchewan Dept. of the Environ. 1981 R
 Schwan et al. 1985 R *
 Scrivener and Brownlee 1982 R *
 Silsbee and Larson 1983 F *
 Swanson and Lienkaemper No date R *
 Swanston 1969 F *
 Swindel et al. 1983 F
 Thomas 1985 F
 Toews and Brownlee 1981 R *
 U.S. Environmental Protection Agency 1973 R *
 USFWS 1982 R
 Wagener 1984 F
 Welch et al. 1977 F *
 Wilson 1960 R *
 Yee and Roelofs 1980 R *

e. Removal of substrate materials

Aldrich and Johnson 1979 F *
 Bjornn et al. 1977 F
 Cordone and Kelly 1961 R
 Ruth and Harris 1975 R *
 Saskatchewan Dept. of the Environ. 1981 R
 Swanston 1969 F *
 Thomas 1985 F
 Wagener 1984 F

f. Physical disturbance of substrate

ADEC and R and M Consultants 1980 R *
 Aldrich and Johnson 1979 F *
 Barton 1977 F *
 Beschta 1978 F *
 Beschta 1979 F *
 Bjornn et al. 1977 F
 Bottom et al. 1985 R *
 Brown (G.W.) 1972 R *
 Brown (G.W.) and Krygier 1971 F *
 Burns 1970 F *
 Cederholm et al. 1981 F *
 Chamberlin 1982 R *
 Chutter 1969 R *
 Cordone and Kelly 1961 R

Cowen 1974 R *
 Crouse et al. 1981 F *
 Elliott 1986 R *
 Everest and Harr 1982 R *
 Fredriksen 1970 F *
 Gibbons and Salo 1973 R *
 Harris 1973 F *
 Hartman et al. 1983 R *
 Kochenderfer 1970 R
 Koski and Walter 1977 R *
 Lantz 1971a R *
 Lenat et al. 1981 F *
 Lull 1959 F *
 McCashion and Rice 1983 F *
 Meehan 1974 R *
 Megahan and Kidd 1972 F *
 Oregon St. Game Commission et al. 1955 F
 Rice et al. 1972 R *
 Ruth and Harris 1975 R *
 Saskatchewan Dept. of the Environ. 1981 R
 Silsbee and Larson 1983 F *
 Swanson and Dyrness 1975 F *
 Swanston 1969 F *
 Swanston 1970 F *
 Swanston 1971 R *
 Swindel et al. 1983 F
 Thomas 1985 F
 U.S. Environmental Protection Agency 1973 R *
 U.S. Forest Service et al. 1976 F
 Wagener 1984 F
 Welch et al. 1977 F *
 Wilson 1960 R *
 Yee and Roelofs 1980 R *

g. Removal or alteration of natural cover: riparian vegetation

Barrick 1984 F *
 Brown (G.W.) 1972 R *
 Bryant 1980 F *
 Bryant 1983 R *
 Burns 1972 F *
 Bustard and Narver 1975b F
 Chamberlin 1982 R *
 Cowan and Oswood 1983 F
 Cowen 1974 R *
 Culp and Davies 1983 F *
 Erman and Mahoney 1983 F *
 Erman et al. 1977 F *
 Everest and Harr 1982 R *
 Gibbons and Salo 1973 R *

Hartman et al. 1983 R *
 Karr and Schlosser 1977 R *
 Koski and Walter 1977 R *
 Koski et al. 1984 F *
 Lantz 1971a R *
 Lotspeich 1971 R *
 Lotspeich and Helmers 1974 R
 Narver 1972 F *
 Oregon Wildlife Commission 1974 *
 Reed and Elliott 1972 F *
 Reiser and Bjornn 1979 R *
 Ringler and Hall 1975 F *
 Ruth and Harris 1975 R *
 Schwan et al. 1985 R *
 Smith 1976 F
 Swanson and Lienkaemper No date R *
 U.S. Forest Service et al. 1976 F
 USACRREL 1980 F *
 USFWS 1982 R
 Whitney and Bailey 1959 F *

h. Removal or alteration of natural cover: aquatic vegetation

Bottom et al. 1985 R *
 Bryant 1980 F *
 Bryant 1983 R *
 Culp and Davies 1983 F *
 Hartman and Holtby 1982 R
 Keller and Swanson 1979 F
 Meehan 1974 R *
 Reed and Elliott 1972 F *
 Reiser and Bjornn 1979 R *
 Schwan et al. 1985 R *
 Swanson and Dyrness 1975 F *
 Swanson and Lienkaemper No date R *

i. Removal or alteration of natural cover: overhanging bank or shoreline

Barrick 1984 F *
 Bryant 1980 F *
 Bustard and Narver 1975a F
 Chamberlin 1982 R *
 Cooper and Wesche 1976 R
 Hartman et al. 1983 R *
 Keller and Swanson 1979 F
 Lotspeich 1971 R *
 Lotspeich and Helmers 1974 R
 Narver 1972 F *
 Reed and Elliott 1972 F *

Reiser and Bjornn 1979 R *

Schwan et al. 1985 R *

j. Addition of physical barriers: diversions

Bradt and Wieland 1978 F

Cooper and Wesche 1976 R

Dryden and Stein 1975 R *

Lotspeich 1971 R *

Lotspeich and Helmers 1974 R

k. Addition of physical barriers: partial obstructions

Barrick 1984 F *

Bell 1986 R

Cederholm 1977 R *

Chamberlin 1982 R *

Cowen 1974 R *

Lotspeich 1971 R *

Lotspeich and Helmers 1974 R

Ruth and Harris 1975 R *

Saskatchewan Dept. of the Environ. 1981 R

Schwan et al. 1985 R *

Swanson and Lienkaemper No date R *

Toews and Brownlee 1981 R *

Yee and Roelofs 1980 R *

l. Change in level of dissolved oxygen, nitrogen

Bartsch 1960 R *

Brannon 1965 L

Chamberlin 1982 R *

Gibbons and Salo 1973 R *

Hall and McKay 1983 R *

Koski and Walter 1977 R *

Meehan 1974 R *

Oregon Wildlife Commission 1974 *

Phillips 1971 R *

Reiser and Bjornn 1979 R *

Ringler and Hall 1975 F *

Rosenberg and Snow 1975 R *

Scrivener and Brownlee 1982 R *

Shumway et al. 1964 F *

Wilson 1960 R *

m. Change in levels of pH, alkalinity, or hardness

Huckabee et al. 1975 F *

LaPerriere et al. 1983 F

Schwan et al. 1985 R *

n. Change in levels of heavy metals

LaPerriere et al. 1983 F
Martin 1983 F
Wagener 1984 F

o. Introduction of biocides

Koski and Walter 1977 R *
U.S. Environmental Protection Agency 1973 R *

p. Change in levels of other toxins--bark or log
leachates

Schwan et al. 1985 R *

q. Change in levels of other toxins--other

Huckabee et al. 1975 F *

r. Change in levels of hydrocarbons

Huckabee et al. 1975 F *

s. Introduction or removal of species

Burton et al. 1976 F
Fredriksen et al. 1975 R *
Hartman and Holtby 1982 R
Hartman et al. 1983 R *
Karr and Schlosser 1977 R *
Koski and Walter 1977 R *
Schwan et al. 1985 R *
U.S. Environmental Protection Agency 1973 R *

t. Artificial attractant to biological organisms

Erman and Mahoney 1983 F *
Erman et al. 1977 F *
Reed and Elliott 1972 F *

11. Grazing:

a. Change in water temperature

Heming 1982 L *
Heming et al. 1982 L *
Platts 1981b R
Platts and Rinne 1985 R

b. Change in depth or velocity of water

Cooper and Wesche 1976 R
May and Davis 1981 R
Platts 1981a F
Platts 1981b R
Platts and Rinne 1985 R

c. Change in turbidity or suspended sediments

Chapman and Knudsen 1980 F *
Cordone and Kelly 1961 R
Lloyd 1985 R *
May and Davis 1981 R
Noggle 1978 L *
Platts 1981a F
Wyoski 1978 R

d. Addition of substrate materials

Cordone and Kelly 1961 R
May and Davis 1981 R
Platts 1981a F
Platts 1981b R

e. Physical disturbance of substrate

Cordone and Kelly 1961 R
May and Davis 1981 R
Platts 1981a F
Platts 1981b R
Platts and Rinne 1985 R

f. Removal or alteration of natural cover: riparian vegetation

Chapman and Knudsen 1980 F *
Cowan and Oswood 1983 F
Platts 1981a F
Platts 1981b R
Platts and Rinne 1985 R

g. Removal or alteration of natural cover: overhanging bank or shoreline

Cooper and Wesche 1976 R
May and Davis 1981 R
Platts 1981b R

h. Addition of physical barriers: diversions

- Cooper and Wesche 1976 R
- i. Physical trampling or crushing
 - Platts 1981b R
 - Striffler 1960 R
- j. Introduction or removal of species
 - Kuenzler et al. 1977 F *
 - Platts 1981b R
- 12. Human disturbance:
 - a. Change in turbidity or suspended sediments
 - Aukerman and Springer 1976 F
 - Barrick 1984 F *
 - b. Removal or alteration of natural cover:
overhanging bank or shoreline
 - Barrick 1984 F *
 - c. Increase in hydrostatic pressure or noise
 - Barrick 1984 F *
 - d. Physical trampling or crushing
 - Striffler 1960 R
 - e. Change in level of dissolved oxygen, nitrogen
 - Aukerman and Springer 1976 F
 - f. Introduction or removal of species
 - Aukerman and Springer 1976 F
- 13. Log storage/transport:
 - a. Change in turbidity or suspended sediments
 - Oregon Wildlife Commission 1974 *
 - b. Addition of substrate materials
 - Can. Dept. Fish. and Int. Pac. Salmon Fish. Comm. 1966 F

Schuytema and Shankland 1976 F
Toews and Brownlee 1981 R *

c. Physical disturbance of substrate

Can. Dept. Fish. and Int. Pac. Salmon Fish. Comm. 1966 F
Toews and Brownlee 1981 R *

d. Change in level of dissolved oxygen, nitrogen

Oregon Wildlife Commission 1974 *
Schuytema and Shankland 1976 F

e. Change in levels of other toxins--bark or log
leachates

Can. Dept. Fish. and Int. Pac. Salmon Fish. Comm. 1966 F
Cederholm 1977 R *
Peters et al. 1976 L *
Schuytema and Shankland 1976 F
Servizi et al. 1970 L
Toews and Brownlee 1981 R *

f. Change in levels of hydrocarbons

Rankin 1979 L

14. Processing geothermal energy:

a. Change in water temperature

Suter 1978

b. Impingement or entrainment or entanglement

Suter 1978

c. Change in levels of other toxins--other

Suter 1978

d. Change in levels of hydrocarbons

Suter 1978

15. Processing lumber/kraft/pulp:

a. Change in turbidity or suspended sediments

Hall 1969 R
Kramer and Smith 1965 *

b. Addition of substrate materials

Bartsch 1960 R *
Hall 1969 R
Kramer and Smith 1965 *

c. Change in levels of pH, alkalinity, or hardness

Hall 1969 R

d. Change in levels of chlorinated compounds

Hall 1969 R

e. Change in levels of other toxins--bark or log leachates

Hall 1969 R
Peters et al. 1976 L *

f. Change in levels of other toxins--other

Hall 1969 R

g. Change in levels of hydrocarbons

Hall 1969 R

16. Processing minerals:

a. Change in water temperature

ADF&G 1983 R
Brown (R.J.) and Baker 1975 R *
Caplice 1959 F
Heming et al. 1982 L *
Karr and Schlosser 1977 R *
Woodward-Clyde Consultants 1980 F

b. Change in depth or velocity of water

ADF&G 1983 R
Brannon 1965 L
Brown (R.J.) and Baker 1975 R *
Caplice 1959 F
Cooper and Wesche 1976 R
Irizarry 1969 F

Martin and Platts 1981 R
 Singleton et al. 1981 F
 Woodward-Clyde Consultants 1980 F

c. Change in turbidity or suspended sediments

ADF&G 1983 R
 Bell 1986 R
 Birtwell et al. 1984 F
 Bjornn et al. 1977 F
 Bowden et al. 1983 R
 Brown (R.J.) and Baker 1975 R *
 Campbell 1954 F
 Caplice 1959 F
 Clarke 1974 R
 Dept. of Envir. Dept. of Fish. and Oceans 1983 R
 Gammon 1970 F
 Gore and Johnson 1980 F
 Hall and McKay 1983 R *
 Harvey et al. 1982 F
 Irizarry 1969 F
 Karr and Schlosser 1977 R *
 LaPerriere et al. 1983 F
 Lloyd 1985 R *
 Lotspeich and Helmers 1974 R
 Martin and Platts 1981 R
 Mathers et al. 1981 F
 McLeay et al. 1983 F *
 McLeay et al. 1984 L *
 Redding and Schreck 1980 L *
 Sigler et al. 1984 L *
 Simmons 1984 F
 Smith and Sykora 1976 L
 Sumner and Smith 1940 F
 Wagener 1984 F
 Weber and Post 1985 F
 Woodward-Clyde Consultants 1980 F
 Wydoski 1978 R

d. Addition of substrate materials

ADF&G 1983 R
 Bartsch 1960 R *
 Bjornn et al. 1977 F
 Bowden et al. 1983 R
 Brown (R.J.) and Baker 1975 R *
 Campbell 1954 F
 Caplice 1959 F
 Gammon 1970 F
 Hall and McKay 1983 R *
 Harvey et al. 1982 F

Johnson 1984b R *

LaPerriere et al. 1983 F

Martin and Platts 1981 R

McLeay et al. 1983 F *

Phillips et al. 1975 L *

Shaw and Maga 1943 F

Singleton et al. 1981 F

Soroka and Mackenzie-Grieve 1983 F

Sumner and Smith 1940 F

Wagener 1984 F

Weber and Post 1985 F

e. Removal of substrate materials

Bjornn et al. 1977 F

Bowden et al. 1983 R

Brown (R.J.) and Baker 1975 R *

Campbell 1954 F

Caplice 1959 F

Harvey et al. 1982 F

Martin and Platts 1981 R

Singleton et al. 1981 F

Sumner and Smith 1940 F

Wagener 1984 F

f. Physical disturbance of substrate

Bjornn et al. 1977 F

Bowden et al. 1983 R

Brown (R.J.) and Baker 1975 R *

Campbell 1954 F

Caplice 1959 F

Gore and Johnson 1980 F

Harvey et al. 1982 F

Johnson 1984b R *

Martin and Platts 1981 R

Shaw and Maga 1943 F

Singleton et al. 1981 F

Soroka and Mackenzie-Grieve 1983 F

Sumner and Smith 1940 F

Wagener 1984 F

Weber and Post 1985 F

Woodward-Clyde Consultants 1980 F

g. Removal or alteration of natural cover: riparian vegetation

Brown (R.J.) and Baker 1975 R *

Cowan and Oswood 1983 F

Karr and Schlosser 1977 R *

Lotspeich and Helmers 1974 R

- Martin and Platts 1981 R
 Weber and Post 1985 F
 Woodward-Clyde Consultants 1980 F
- h. Removal or alteration of natural cover:
overhanging bank or shoreline
- Cooper and Wesche 1976 R
 Lotspeich and Helmers 1974 R
 Singleton et al. 1981 F
 Woodward-Clyde Consultants 1980 F
- i. Addition of physical barriers: impoundments
- Woodward-Clyde Consultants 1980 F
- j. Addition of physical barriers: diversions
- Cooper and Wesche 1976 R
 Lotspeich and Helmers 1974 R
 Woodward-Clyde Consultants 1980 F
- k. Addition of physical barriers: partial
obstructions
- Lotspeich and Helmers 1974 R
- l. Impingement or entrainment or entanglement
- Griffith and Andrews 1981 F
- m. Change in level of dissolved oxygen, nitrogen
- ADF&G 1983 R
 Bowden et al. 1983 R
 Brannon 1965 L
 Caplice 1959 F
 Hall and McKay 1983 R *
 Woodward-Clyde Consultants 1980 F
- n. Change in levels of pH, alkalinity, or hardness
- Caplice 1959 F
 Clarke 1974 R
 Daye 1980 R
 Johnston et al. 1984 L
 LaPerriere et al. 1983 F
 Lett et al. 1976 L
 Martin and Platts 1981 R
- o. Change in levels of heavy metals

Beamish et al. 1975 F
 Bell 1986 R
 Brown (E.J.) et al. 1982 F
 Brown (V.M.) et al. 1969 L *
 Chapman 1978 L
 Clarke 1974 R
 Finlayson and Ashuckian 1979 L
 Harrison 1975 L
 Hartman 1978 L
 LaPerriere et al. 1983 F
 Lett et al. 1976 L
 Martin 1983 F
 Martin and Platts 1981 R
 Ray and Coffin 1977 R
 Soroka and Mackenzie-Grieve 1983 F
 Wagener 1984 F

p. Change in levels of chlorinated compounds

Clarke 1974 R

q. Change in levels of hydrocarbons

Gore and Johnson 1980 F
 Harrison 1975 L
 Smith and Sykora 1976 L

r. Change in levels of nutrients

Brown (V.M.) et al. 1969 L *

s. Introduction or removal of species

Karr and Schlosser 1977 R *

17. Processing oil/gas:

a. Change in levels of heavy metals

Brown (V.M.) et al. 1969 L *
 Cote 1976 R

b. Change in levels of other toxins--other

Cote 1976 R

c. Change in levels of hydrocarbons

Cote 1976 R
 Thurston et al. 1984 L

d. Change in levels of nutrients

Brown (V.M.) et al. 1969 L *

Cote 1976 R

Dauble et al. 1983 L

DeGraeve 1982 L *

Mitrovic et al. 1968 L *

Swift 1978 L *

18. Sewage disposal:

a. Change in water temperature

Tsai 1970 F

b. Change in turbidity or suspended sediments

Hartmann 1983 F

Tsai 1973 F

c. Addition of physical barriers: other

Tsai 1970 F

d. Change in level of dissolved oxygen, nitrogen

Shumway et al. 1964 F *

Tsai 1970 F

Tsai 1975 R

e. Change in levels of pH, alkalinity, or hardness

Tsai 1970 F

f. Change in levels of heavy metals

Duba 1981 F

Fraser and Clark 1984 L

Hartman 1978 L

Hartmann 1983 F

Ray and Coffin 1977 R

g. Change in levels of chlorinated compounds

Brooks and Seegert 1975 R

Clarke et al. 1977 L

Gehrs and Southworth 1975 L

Kopperman et al. 1975 R

Tsai 1970 F

Tsai 1973 F

- Tsai 1975 R
 - h. Change in levels of other toxins--other
 - Tsai 1975 R
 - i. Change in levels of hydrocarbons
 - Haywood 1983 R
 - Klaverkamp et al. 1976 L
 - Sutterlin et al. 1971 L
 - Thurston et al. 1984 L
 - Tsai 1970 F
 - Tsai 1975 R
 - j. Change in levels of nutrients
 - Brown (V.M.) et al. 1969 L *
 - Hartmann 1983 F
 - Mitrovic et al. 1968 L *
 - Swift 1978 L *
 - k. Introduction or removal of species
 - Hartmann 1983 F
 - l. Artificial attractant to biological organisms
 - Tsai 1973 F
- 19. Solid waste disposal:
 - a. Change in turbidity or suspended sediments
 - Peddicord and McFarland 1978 L
 - b. Addition of substrate materials
 - Moore and Sutherland 1981 F
 - Peddicord and McFarland 1978 L
 - c. Physical disturbance of substrate
 - Peddicord and McFarland 1978 L
 - d. Change in levels of heavy metals
 - Chapman 1978 L
 - Finlayson and Ashuckian 1979 L
 - Hartman 1978 L

Martin 1983 F
Moore and Sutherland 1981 F
Peddicord and McFarland 1978 L
Seelye et al. 1982 L *

e. Change in levels of chlorinated compounds

Peddicord and McFarland 1978 L

f. Change in levels of hydrocarbons

Moore and Sutherland 1981 F
Seelye et al. 1982 L *

* 20. Stream crossing - fords:

a. Change in water temperature

Day and Carvell 1979 F

b. Change in depth or velocity of water

Elliott 1980 F *

c. Change in turbidity or suspended sediments

Cordone and Kelly 1961 R
Oregon Wildlife Commission 1974 *

d. Addition of substrate materials

Cordone and Kelly 1961 R

e. Physical disturbance of substrate

Cordone and Kelly 1961 R

f. Addition of physical barriers: partial obstructions

Reed and Elliott 1972 F *

21. Stream crossing - structures:

a. Change in water temperature

USACRREL 1980 F *
USFWS 1982 R

b. Change in depth or velocity of water

Anderson and Bryant 1980 R
Bell 1986 R
Bryant 1981 F
Dane 1978a R
Dane 1978b R
Elliott 1982 F
Harr et al. 1975 F
MacPhee and Watts 1975 F
Oregon Wildlife Commission 1974 *
Peters and Alvord 1964 R
Saskatchewan Dept. of the Environ. 1981 R
USFWS 1982 R
Watts 1974 R

c. Change in turbidity or suspended sediments

Dryden and Stein 1975 R *
Lotspeich 1971 R *
Lotspeich and Helmers 1974 R
USACRREL 1980 F *
USFWS 1982 R

d. Addition of substrate materials

USFWS 1982 R

e. Removal or alteration of natural cover: riparian vegetation

Lotspeich 1971 R *
Lotspeich and Helmers 1974 R
USACRREL 1980 F *
USFWS 1982 R

f. Removal or alteration of natural cover: overhanging bank or shoreline

Lotspeich 1971 R *
Lotspeich and Helmers 1974 R

g. Addition of physical barriers: diversions

Lotspeich 1971 R *

h. Addition of physical barriers: partial obstructions

Anderson and Bryant 1980 R
Bell 1986 R

Bryant 1981 F
 Dane 1978a R
 Dane 1978b R
 Dryden and Stein 1975 R *
 Elliott 1982 F
 Gibbons and Salo 1973 R *
 Lotspeich 1971 R *
 Lotspeich and Helmers 1974 R
 MacPhee and Watts 1975 F
 Oregon Wildlife Commission 1974 *
 Reed and Elliott 1972 F *
 Rosenberg and Snow 1975 R *
 Saskatchewan Dept. of the Environ. 1981 R
 Timbol and Maciolek 1978 F *
 U.S. Forest Service et al. 1976 F
 Watts 1974 R

22. Transport of oil/gas/water - land:

a. Change in turbidity or suspended sediments

Hok 1969 F

b. Physical disturbance of substrate

Hok 1969 F

c. Removal or alteration of natural cover: aquatic vegetation

Hok 1969 F

23. Transport of oil/gas/water - water:

a. Change in levels of nutrients

Brown (V.M.) et al. 1969 L *
 DeGraeve 1982 L *
 Mitrovic et al. 1968 L *
 Rosenberg and Wiens 1976 F
 Swift 1978 L *

24. Transport of personnel/equipment/material - land:

a. Change in water temperature

Day and Carvell 1979 F
 R and M Consultants 1977 R *

- b. Change in depth or velocity of water
 - R and M Consultants 1977 R *
 - c. Change in turbidity or suspended sediments
 - Day and Carvell 1979 F
 - Hok 1969 F
 - R and M Consultants 1977 R *
 - d. Addition of substrate materials
 - Day and Carvell 1979 F
 - e. Physical disturbance of substrate
 - Hok 1969 F
 - f. Removal or alteration of natural cover: riparian vegetation
 - Day and Carvell 1979 F
 - g. Removal or alteration of natural cover: aquatic vegetation
 - Hok 1969 F
 - h. Change in level of dissolved oxygen, nitrogen
 - R and M Consultants 1977 R *
 - i. Change in levels of heavy metals
 - Martin 1983 F
 - VanHassel 1979 F
 - Wilber 1978 F
 - j. Change in levels of nutrients
 - Wagemann et al. 1974 L
25. Water regulation/withdrawal/irrigation:
- a. Change in water temperature
 - Becker et al. 1982 F
 - Brett et al. 1982 L
 - Ciliberti 1980 F
 - Decker-Hess and McMullin 1983 F

Geen and Andrew 1961 F
 Hall 1979 F
 Heming 1982 L *
 Heming et al. 1982 L *
 Lister and Walker 1962 F
 Reiser 1981 F
 Reiser and Ramey 1985 R
 Servizi and Jensen 1977 L
 Winger 1972 F

b. Change in depth or velocity of water

Antoine and Benson-Evans 1982 F
 Bartsch 1960 R *
 Becker et al. 1982 F
 Bell 1986 R
 Bodaly and Lesack 1984 F
 Bodaly et al. 1984a F *
 Bodaly et al. 1984b F
 Bottom et al. 1985 R *
 Brannon 1965 L
 Ciliberti 1980 F
 Decker-Hess and McMullin 1983 F
 Hall 1979 F
 Hesse and Newcomb 1982 F
 Keefer 1977 F *
 Kraft 1972 F *
 Lister and Walker 1962 F
 McMaster et al. 1977 F
 Morris et al. 1968 F *
 Mosley 1982 F
 Reiser 1981 F
 Reiser and Ramey 1985 R
 Reiser and White 1983 L
 Trautman and Gartman 1974 F *
 White et al. 1980 L
 Winger 1972 F
 Wydoski and Helm 1980 F

c. Change in turbidity or suspended sediments

Ciliberti 1980 F
 Geen and Andrew 1961 F
 Hesse and Newcomb 1982 F
 Reiser and Ramey 1985 R
 Reiser and White 1983 L
 Trautman and Gartman 1974 F *
 Wydoski 1978 R

d. Addition of substrate materials

Bartsch 1960 R *

Reiser 1981 F

Reiser and Ramey 1985 R

Trautman and Gartman 1974 F *

e. Removal of substrate materials

Reiser and Ramey 1985 R

f. Physical disturbance of substrate

Reiser 1981 F

g. Addition of physical barriers: impoundments

Hall 1979 F

h. Addition of physical barriers: diversions

Bodaly et al. 1984a F *

Bodaly et al. 1984b F

i. Increase in hydrostatic pressure or noise

Bell 1986 R

j. Impingement or entrainment or entanglement

Bell 1986 R

Fritz 1980 R

Hall 1979 F

Nelson and Beckman 1980 F

k. Change in level of dissolved oxygen, nitrogen

Bell 1986 R

Brannon 1965 L

Ciliberti 1980 F

Decker-Hess and McMullin 1983 F

Ebel et al. 1975 F

Hesse and Newcomb 1982 F

Meekin and Allen 1974 F

Meekin and Turner 1974 L

Reiser and Ramey 1985 R

l. Change in levels of pH, alkalinity, or hardness

Geen and Andrew 1961 F

Hesse and Newcomb 1982 F

m. Change in levels of heavy metals

Bodaly et al. 1984a F *

n. Introduction or removal of species

Bodaly and Lesack 1984 F

Introduction

This index provides literature citations pertaining to environmental impacts to fisheries resources or their habitats. An annotation for each citation is located in part 2 of this volume (bound separately). This index is divided into two sections: 1) marine fish and shellfish, and 2) freshwater fish. Within each section, citations are organized hierarchically; 22 defined impact categories form the primary structure (see below), and 30 activities form the secondary structure.

Each document referenced in this index is characterized as either a field, laboratory, or review study. This information appears in coded form immediately to the right of each literature citation (F, L, or R, respectively). In addition to this code, an asterisk is used to identify references used as source documents for preparing guidelines on selected activities (contained in a separate volume).

List of Impacts

1. Change in water temperature
2. Change in depth or velocity of water
3. Change in turbidity or suspended sediments
4. Addition of substrate materials
5. Removal of substrate materials
6. Physical disturbance of substrate materials
7. Alteration of natural cover:
 - Riparian vegetation
 - Aquatic vegetation
 - Overhanging bank or shoreline
8. Addition of physical barriers:
 - Impoundments
 - Diversions
 - Partial obstructions
 - Other
9. Increase in hydrostatic pressure or noise
10. Impingement or entrainment or entanglement
11. Physical trampling or crushing
12. Change in levels of dissolved oxygen or nitrogen
13. Change in levels of pH, alkalinity, or hardness
14. Change in level of salinity
15. Change in levels of heavy metals
16. Change in levels of chlorinated compounds
17. Change in levels of biocides
18. Change in levels of other toxic compounds:
 - Bark or log leachates
 - Sulfurous compounds
 - Other
19. Change in levels of hydrocarbons
20. Change in levels of nutrients
21. Introduction or removal of species
22. Artificial attractant to biological organisms

Marine Fish and Shellfish

This section provides citations pertaining to impacts on marine fish and shellfish or their habitats. Table 4 is a summary of the activities and impacts for which documentation was located. Impact categories for which documentation has been located are listed in the same order as they are found in table 4. Users should note that no documentation reported for some activity/impact categories may reflect either a real absence of research pertaining to that topic or a lack of completeness of this database, and does not necessarily imply that the activity does not result in adverse impacts to aquatic resources. Impact categories for which no documentation was located are as follows:

Addition of physical barriers--other

Table 4. Summary of the Literature for Defined Activity/Impact Categories: Marine Fish and Shellfish

Impact	Activity																			
	Blasting	Burning	Channelizing waterways	Chemical application	Clearing and tree harvest	Draining	Dredging	Drilling	Fencing (aquatic and wetland habitats)	Filling (terrestrial)	Grading/plowing	Grazing	Human disturbance	Log storage/transport	Metting	Processing geothermal energy	Processing lumber/kraft/pulp	Processing minerals	Processing oil/gas	Sewage disposal
Change in water temperature		X	X	X	X	X	X	X	X	X	X				X	X	X	X	X	
Change in depth or velocity of water		X	X	X	X	X	X	X	X	X	X					X	X	X	X	
Change in turbidity or suspended sediments		X	X	X	X	X	X	X	X	X	X		X			X	X	X	X	
Addition of substrate materials			X	X	X	X	X	X	X	X	X		X			X	X	X	X	
Removal of substrate materials			X	X	X	X	X	X	X	X	X		X			X	X	X	X	
Physical disturbance of substrate materials			X	X	X	X	X	X	X	X	X		X			X	X	X	X	
Alteration of natural cover:																				
Riparian vegetation									X											
Aquatic vegetation									X				X							
Overhanging bank or shoreline			X						X	X										
Addition of physical barriers:																				
Impoundments																				X
Diversions									X										X	
Partial obstructions						X		X					X						X	
Other																				
Increase in hydrostatic pressure or noise	X					X	X		X			X	X						X	X
Impingement or entrainment or entanglement													X							X
Physical trampling or crushing													X							
Change in level of dissolved oxygen, nitrogen	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Change in levels of pH, alkalinity, or hardness	X		X													X	X	X	X	
Change in level of salinity				X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Change in levels of heavy metals				X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Change in levels of chlorinated compounds				X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Introduction of biocides		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Change in levels of other toxic compounds:																				
Bark or log leachates			X										X	X						
Sulfurous compounds													X	X		X	X	X	X	
Other				X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Change in levels of hydrocarbons				X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Change in levels of nutrients			X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Introduction or removal of species				X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Artificial attractant to biological organisms	X			X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X

X - Documented impact

1. Change in water temperature:
 - a. Channelizing waterways

Darnell et al. 1976 R
 - b. Clearing and tree harvest

Koski and Walter 1977 R *
 - c. Dredging

Darnell et al. 1976 R
 - d. Drilling

Linden 1978 L

Varanasi et al. 1981 L
 - e. Filling (aquatic and wetland habitats):

Bishop et al. 1983 R *

Cardwell et al. 1978 F

Cardwell et al. 1980a F *

Cardwell et al. 1980b F *

Carstea et al. 1975 R *

Craig and Griffiths 1981 F

Drinkwater 1979 F *

Elgershuizen 1981 F

Hastings 1972 F *

Johnson 1984a R *

Moles and Pella 1984 L

Mulvihill et al. 1980 R *

Nece et al. 1975 F *

Vilks et al. 1975 F
 - f. Grading/plowing

Coutant 1976 R

Koski and Walter 1977 R *
 - g. Processing geothermal energy

Coutant 1976 R
 - h. Processing lumber/kraft/pulp

Coutant 1976 R
 - i. Processing minerals (including gravel)

Coutant 1976 R

j. Processing oil/gas

Coutant 1976 R

k. Sewage disposal

Coutant 1976 R
Dwyer and Kramer 1975 L
Otte and Levings 1975 F
Sayce and Tufts 1972 L
Stober et al. 1980 L

l. Transport of oil/gas/water - water

Korn et al. 1979 L
Linden 1978 L
Varanasi et al. 1981 L

m. Water regulation/withdrawal/irrigation

Dwyer and Kramer 1975 L
Hurley and Woodall 1968 F

2. Change in depth or velocity of water:

a. Channelizing waterways

Darnell et al. 1976 R

b. Clearing and tree harvest

Koski and Walter 1977 R *

c. Dredging

Darnell et al. 1976 R
Nece et al. 1975 F *

d. Filling (aquatic and wetland habitats):

Cardwell et al. 1978 F
Carstea et al. 1975 R *
Clewell et al. 1976 F
Drinkwater 1979 F *
Elgershuizen 1981 F
Erikson 1984 F *
Heckman 1984 F *
Miller and Currin 1981 F
Mulvihill et al. 1980 R *
Nece et al. 1975 F *

Orrell and Johnson 1975 F *
 Sawaragi and Kobune 1970 L *
 Starr et al. 1981 R
 U.S. Army Corps of Engineers 1985 F *
 Washington Dept. of Fisheries 1971 R

e. Stream crossing - structures

Miller and Currin 1981 F

3. Change in turbidity or suspended sediments:

a. Channelizing waterways

Darnell et al. 1976 R

b. Clearing and tree harvest

Koski and Walter 1977 R *
 O'Connor et al. 1976 L *
 O'Connor et al. 1977 L

c. Draining

O'Connor et al. 1976 L *

d. Dredging

Allen and Hardy 1980 R
 Anderson et al. 1981a F *
 Anderson et al. 1981b F *
 Anderson et al. 1981c F *
 Brannon 1978 R
 Burks and Engler 1978 F *
 Craig 1985 F
 Cronin et al. 1971 R *
 Darnell et al. 1976 R
 Hirsch et al. 1978 F
 Johnston and Wildish 1981 L
 Morton 1977 R
 Nakai 1977 R
 O'Connor et al. 1977 L
 Peddicord and McFarland 1976 L
 Peddicord and McFarland 1978 L
 Salo et al. 1980 F *
 Sherk et al. 1976 L
 Starr et al. 1981 R
 Stern and Stickle 1978 R
 Wright 1978 F

e. Drilling

Houghton and Beyer 1980 L
Lawrence and Scherer 1974 L
Lees and Houghton 1980 F
Maurer et al. 1981 F
Peddicord and McFarland 1978 L
Tornberg et al. 1980 F

f. Filling (aquatic and wetland habitats):

Carstea et al. 1975 R *
Elgershuizen 1981 F
Mulvihill et al. 1980 R *
Starr et al. 1981 R
Washington Dept. of Fisheries 1971 R

g. Grading/plowing

Koski and Walter 1977 R *
O'Connor et al. 1976 L *
O'Connor et al. 1977 L
Stern and Stickle 1978 R

h. Log storage/transport

Duval et al. 1980 R
Meyers 1977 F

i. Processing lumber/kraft/pulp

Parker and Sibert 1973 F

j. Sewage disposal

Lehmann 1975 R
Read et al. 1983 F

k. Solid waste disposal

Anderson et al. 1981a F *
Anderson et al. 1981b F *
Anderson et al. 1981c F *
Bernard 1976 R
Beyer et al. 1975 F
Brickell and Goering 1971 F
Burks and Engler 1978 F *
Champ et al. 1981 R
Fisheries Research Institute 1971 F
Hirsch et al. 1978 F
Johnston and Wildish 1981 L

Lees and Houghton 1980 F
 Lehmann 1975 R
 Malick et al. 1971 F
 Morton 1977 R
 NOAA 1980 F
 Norton et al. 1981 F
 O'Connor et al. 1976 L *
 O'Connor et al. 1977 L
 Peddicord and McFarland 1976 L
 Peddicord and McFarland 1978 L
 Pequegnat et al. 1978
 Sherk et al. 1976 L
 Stern and Stickle 1978 R
 U.S. Environmental Protection Agency 1974 R
 Wright 1978 F

1. Water regulation/withdrawal/irrigation

Rozengurt and Herz 1981 R

4. Addition of substrate materials:

a. Clearing and tree harvest

Koski and Walter 1977 R *
 O'Connor et al. 1976 L *
 O'Connor et al. 1977 L
 Smith 1978 L *

b. Dredging

Craig 1985 F
 Johnston and Wildish 1981 L
 O'Connor et al. 1976 L *
 Smith 1978 L *
 Wright 1978 F

c. Drilling

Lees and Houghton 1980 F
 Maurer et al. 1981 F
 Peddicord and McFarland 1978 L

d. Filling (aquatic and wetland habitats):

Anderson et al. 1981a F *
 Anderson et al. 1981b F *
 Anderson et al. 1981c F *
 Cardwell and Koons 1981 F *
 Carstea et al. 1975 R *

Cronin et al. 1971 R *
 Erikson 1984 F *
 Harris 1981 R *
 Heiser and Finn 1970 F *
 Millikan et al. 1974 F *
 Mock 1966 F *
 Mulvihill et al. 1980 R *
 Starr et al. 1981 R
 U.S. Army Coastal Engr. Res. Ctr. 1977 R *

e. Grading/plowing

Koski and Walter 1977 R *
 O'Connor et al. 1976 L *
 O'Connor et al. 1977 L
 Smith 1978 L *

f. Log storage/transport

Duval et al. 1980 R
 Ellis 1973 F
 Kathman et al. 1984 F
 Koski and Walter 1977 R *
 McDaniel 1973 F
 McGreer et al. 1984 F
 Meyers 1977 F
 O'Clair 1983 F
 Pease 1974 R
 Schaumburg 1973 F
 Schultz and Berg 1976 F
 Sedlak 1982 R

g. Processing lumber/kraft/pulp

Kathman et al. 1984 F
 Schmiede 1980 R

h. Processing minerals (including gravel)

Smith 1978 L *

i. Sewage disposal

Read et al. 1983 F

j. Solid waste disposal

Allen and Hardy 1980 R
 Anderson et al. 1981a F *
 Anderson et al. 1981b F *
 Anderson et al. 1981c F *

Bechtel 1979 F
 Bernard 1976 R
 Brannon 1978 R
 Brickell and Goering 1971 F
 Burks and Engler 1978 F *
 Champ et al. 1981 R
 Chang and Levings 1976 L
 Cronin et al. 1971 R *
 Eagle et al. 1978 F
 Eagle et al. 1979 F
 Elner and Hamet 1984 F
 Feder and Burrell 1982 F
 Fisheries Research Institute 1971 F
 Hirsch et al. 1978 F
 Johnston and Wildish 1981 L
 Karna 1978 F
 Lees and Houghton 1980 F
 Malick et al. 1971 F
 McDaniel 1973 F
 McDaniel et al. 1976 F
 Messieh et al. 1981 F
 Morton 1977 R
 NOAA 1980 F
 O'Connor et al. 1977 L
 Peddicord and McFarland 1976 L
 Peddicord and McFarland 1978 L
 Pequegnat et al. 1978
 Sherk et al. 1976 L
 Stewart and Tangerone 1977 F
 U.S. Environmental Protection Agency 1974 R
 Wright 1978 F

5. Removal of substrate materials:

a. Clearing and tree harvest

O'Connor et al. 1976 L *
 O'Connor et al. 1977 L

b. Dredging

Allen and Hardy 1980 R
 Anderson et al. 1981a F *
 Anderson et al. 1981b F *
 Anderson et al. 1981c F *
 Brannon 1978 R
 Cronin et al. 1971 R *
 Hirsch et al. 1978 F
 Messieh et al. 1981 F
 O'Connor et al. 1977 L

Peddicord and McFarland 1976 L
 Peddicord and McFarland 1978 L
 Sherk et al. 1976 L
 Starr et al. 1981 R
 Sykes and Hall 1970 F

c. Drilling

Maurer et al. 1981 F

d. Filling (aquatic and wetland habitats):

Cardwell and Koons 1981 F *
 Carstea et al. 1975 R *
 U.S. Army Coastal Engn. Res. Ctr. 1977 R *

e. Grading/plowing

O'Connor et al. 1976 L *
 O'Connor et al. 1977 L

f. Solid waste disposal

O'Connor et al. 1976 L *

6. Physical disturbance of substrate materials:

a. Clearing and tree harvest

Koski and Walter 1977 R *
 O'Connor et al. 1976 L *
 O'Connor et al. 1977 L
 Smith 1978 L *

b. Dredging

Allen and Hardy 1980 R
 Anderson et al. 1981a F *
 Anderson et al. 1981b F *
 Anderson et al. 1981c F *
 Brannon 1978 R
 Cronin et al. 1971 R *
 Hirsch et al. 1978 F
 O'Connor et al. 1976 L *
 O'Connor et al. 1977 L
 Peddicord and McFarland 1976 L
 Peddicord and McFarland 1978 L
 Smith 1978 L *
 Sykes and Hall 1970 F

c. Drilling

Peddicord and McFarland 1978 L

d. Filling (aquatic and wetland habitats):

Cardwell and Koons 1981 F *
Carstea et al. 1975 R *
Elgershuizen 1981 F
Trent et al. 1976 F *
U.S. Army Coastal Engr. Res. Ctr. 1977 R *

e. Grading/plowing

Koski and Walter 1977 R *
O'Connor et al. 1976 L *
O'Connor et al. 1977 L
Smith 1978 L *

f. Log storage/transport

Duval et al. 1980 R
Edgell and Ross 1983 R
Ellis 1973 F
Koski and Walter 1977 R *
McGreer et al. 1984 F
Meyers 1977 F
O'Clair 1983 F
Pacific N.W. Poll. Control Council 1971 R
Pease 1974 R
Sedlak 1982 R
Sibert and Harpham 1979 F
U.S. Environmental Protection Agency 1975a R

g. Processing minerals (including gravel)

Smith 1978 L *

h. Solid waste disposal

Allen and Hardy 1980 R
Anderson et al. 1981a F *
Anderson et al. 1981b F *
Anderson et al. 1981c F *
Brannon 1978 R
Hirsch et al. 1978 F
O'Connor et al. 1976 L *
O'Connor et al. 1977 L
Peddicord and McFarland 1976 L
Peddicord and McFarland 1978 L

- 7a. Alteration of natural cover--riparian vegetation:
 - a. Filling (terrestrial)
 - Allen and Hardy 1980 R
- 7b. Alteration of natural cover--aquatic vegetation (including algae):
 - a. Filling (aquatic and wetland habitats):
 - Trent et al. 1976 F *
 - b. Human disturbance
 - Beauchamp and Gowing 1982 F
- 7c. Alteration of natural cover--overhanging bank or shoreline:
 - a. Clearing and tree harvest
 - Koski and Walter 1977 R *
 - b. Filling (aquatic and wetland habitats):
 - Carstea et al. 1975 R *
 - Millikan et al. 1974 F *
 - Salo et al. 1980 F *
 - Starr et al. 1981 R
 - U.S. Army Coastal Engr. Res. Ctr. 1977 R *
 - U.S. Army Corps of Engineers 1981 R *
 - c. Grading/plowing
 - Koski and Walter 1977 R *
- 8a. Addition of physical barriers--impoundments (e.g., hydroelectric dams, settling ponds):
 - a. Water regulation/withdrawal/irrigation
 - Cronin et al. 1971 R *
- 8b. Addition of physical barriers--diversions (e.g., channels, canals):
 - a. Filling (aquatic and wetland habitats):

Cronin et al. 1971 R *

Salo et al. 1980 F *

b. Solid waste disposal

Cronin et al. 1971 R *

8c. Addition of physical barriers--partial obstructions:

a. Dredging

Trent et al. 1976 F *

b. Filling (aquatic and wetland habitats):

Bishop et al. 1983 R *

Cardwell and Koons 1981 F *

Cardwell et al. 1978 F

Cardwell et al. 1980b F *

Carstea et al. 1975 R *

Craig and Griffiths 1981 F

Cronin et al. 1971 R *

Darnell et al. 1976 R

Elgershuizen 1981 F

Erikson 1984 F *

Gerke and Kaczynski 1972 F

Hales 1981 R *

Harris 1981 R *

Hastings 1972 F *

Heckman 1984 F *

Heiser and Finn 1970 F *

Johnson 1984a R *

Millikan et al. 1974 F *

Mock 1966 F *

Mulvihill et al. 1980 R *

Neill et al. 1983 L

Orrell and Johnson 1975 F *

Salo et al. 1980 F *

Sawaragi and Kobune 1970 L *

Simenstad et al. 1980 F *

Starr et al. 1981 R

Trent et al. 1976 F *

U.S. Army Corps of Engineers 1981 R *

U.S. Army Corps of Engineers 1985 F *

Vilks et al. 1975 F

Washington Dept. of Fisheries 1974 R

c. Log storage/transport

Sibert and Harpham 1979 F

d. Solid waste disposal

Cronin et al. 1971 R *

9. Increase in hydrostatic pressure or noise:

a. Blasting

Banner and Hyatt 1973 L
Bishai 1961 L
Falk and Lawrence 1973 F
Goertner 1981 R
Hawkins 1973 R
Hill 1978 R
Hubbs and Rechnitzer 1952 F
Jehl et al. 1980 R
Myrberg 1978 R
Starr et al. 1981 R
Trasky 1976 R
Wiley and Wilson 1975 F
Wright 1982 R

b. Drilling

Banner and Hyatt 1973 L
Hawkins 1973 R
Myrberg 1978 R

c. Filling (aquatic and wetland habitats):

Heiser and Finn 1970 F *

d. Human disturbance

Banner and Hyatt 1973 L
Hawkins 1973 R
Heiser and Finn 1970 F *
Myrberg 1978 R
Olsen 1971 R
Schmiege 1980 R

e. Netting

Hawkins 1973 R

f. Transport of oil/gas/water - water

Banner and Hyatt 1973 L
Myrberg 1978 R
Olsen 1971 R

- g. Transport of personnel/equipment/material - water
 - Banner and Hyatt 1973 L
 - Heiser and Finn 1970 F *
 - Myrberg 1978 R
 - Olsen 1971 R
- h. Water regulation/withdrawal/irrigation
 - Bishai 1961 L
- 10. Impingement or entrainment or entanglement:
 - a. Netting
 - DeGange and Newby 1980 F
 - b. Water regulation/withdrawal/irrigation
 - Goldman and Quinby 1979 F
 - Starr et al. 1981 R
- 11. Physical trampling or crushing:
 - a. Human disturbance
 - Beauchamp and Gowing 1982 F
- 12. Change in level of dissolved oxygen, nitrogen:
 - a. Channelizing waterways
 - Darnell et al. 1976 R
 - b. Clearing and tree harvest
 - Koski and Walter 1977 R *
 - O'Connor et al. 1976 L *
 - O'Connor et al. 1977 L
 - c. Dredging
 - Brannon 1978 R
 - Burks and Engler 1978 F *
 - Darnell et al. 1976 R
 - Morton 1977 R
 - Nece et al. 1975 F *
 - O'Connor et al. 1976 L *

O'Connor et al. 1977 L
Rosenberg 1977 F

d. Filling (aquatic and wetland habitats):

Anderson et al. 1981a F *
Anderson et al. 1981b F *
Anderson et al. 1981c F *
Cardwell and Koons 1981 F *
Cardwell et al. 1980a F *
Cardwell et al. 1980b F *
Carstea et al. 1975 R *
Heiser and Finn 1970 F *
Mulvihill et al. 1980 R *
Nece et al. 1975 F *

e. Grading/plowing

Koski and Walter 1977 R *
O'Connor et al. 1976 L *
O'Connor et al. 1977 L

f. Log storage/transport

Duval et al. 1980 R
Edgell and Ross 1983 R
Koski and Walter 1977 R *
McGreer et al. 1984 F
Pease 1974 R
Schaumburg 1973 F
Schultz and Berg 1976 F
Sedlak 1982 R
Sibert and Harpham 1979 F
U.S. Environmental Protection Agency 1975a R

g. Processing geothermal energy

Coutant 1976 R

h. Processing lumber/kraft/pulp

Coutant 1976 R
Parker and Sibert 1973 F
Schmiege 1980 R
Wildish et al. 1979 F

i. Processing minerals (including gravel)

Coutant 1976 R

j. Processing oil/gas

Coutant 1976 R

k. Sewage disposal

Coutant 1976 R
Evelyn 1972 F
Lehmann 1975 R
McIntyre and Johnston 1975 F
Otte and Levings 1975 F
Rozengurt and Herz 1981 R
Tsai 1975 R

l. Solid waste disposal

Bechtel 1979 F
Bernard 1976 R
Beyer et al. 1975 F
Brannon 1978 R
Brickell and Goering 1971 F
Burks and Engler 1978 F *
Champ et al. 1981 R
Feder and Burrell 1982 F
Fisheries Research Institute 1971 F
Lees et al. 1981 F *
Lehmann 1975 R
Malick et al. 1971 F
Morton 1977 R
O'Connor et al. 1976 L *
O'Connor et al. 1977 L
Pratt et al. 1973 F
Stewart and Tangerone 1977 F
U.S. Environmental Protection Agency 1974 R

m. Water regulation/withdrawal/irrigation

Rozengurt and Herz 1981 R

13. Change in levels of pH, alkalinity, or hardness:

a. Channelizing waterways

Darnell et al. 1976 R

b. Dredging

Darnell et al. 1976 R

c. Processing lumber/kraft/pulp

McLeay et al. 1979 L

- d. Sewage disposal
 - Otte and Levings 1975 F
- e. Solid waste disposal
 - Beyer et al. 1975 F
- 14. Change in level of salinity:
 - a. Drilling
 - Baden 1982 L
 - Stickle et al. 1982 L
 - b. Filling (aquatic and wetland habitats):
 - Bishop et al. 1983 R *
 - Carstea et al. 1975 R *
 - Clewell et al. 1976 F
 - Craig and Griffiths 1981 F
 - Drinkwater 1979 F *
 - Elgershuizen 1981 F
 - Hales 1981 R *
 - Hastings 1972 F *
 - Johnson 1984a R *
 - Miller and Currin 1981 F
 - Moles and Pella 1984 L
 - Mulvihill et al. 1980 R *
 - Nece et al. 1975 F *
 - U.S. Army Coastal Engn. Res. Ctr. 1977 R *
 - U.S. Army Corps of Engineers 1985 F *
 - Vilks et al. 1975 F
 - Washington Dept. of Fisheries 1971 R
 - c. Processing lumber/kraft/pulp
 - Greer and Kosakoski 1978 L
 - d. Sewage disposal
 - Otte and Levings 1975 F
 - e. Stream crossing - structures
 - Miller and Currin 1981 F
 - f. Transport of oil/gas/water - water
 - Baden 1982 L

Stickle et al. 1982 L

g. Water regulation/withdrawal/irrigation

Cronin et al. 1971 R *

Hurley and Woodall 1968 F

Rozengurt and Herz 1981 R

15. Change in levels of heavy metals:

a. Dredging

Bias 1981 F

Bryan and Gibbs 1983 F

Burks and Engler 1978 F *

Burrell and Welhs 1983 L

Hirsch et al. 1978 F

Long 1982 R

Morton 1977 R

Peddicord and McFarland 1978 L

Perttila et al. 1982 F

Rosenberg 1977 F

Stern and Stickle 1978 R

Thompson and Paton 1976 L

Wright 1978 F

b. Drilling

Carls and Rice 1980 L

Carls and Rice 1984 L

Gerber et al. 1980 L

Houghton and Beyer 1980 L

Land 1974 R

Peddicord and McFarland 1978 L

Tornberg et al. 1980 F

c. Filling (aquatic and wetland habitats):

Anderson et al. 1981a F *

Anderson et al. 1981b F *

Anderson et al. 1981c F *

Cardwell et al. 1980b F *

Carstea et al. 1975 R *

d. Grading/plowing

Bryan and Gibbs 1983 F

e. Human disturbance

Young et al. 1979 F

f. Processing minerals (including gravel)

Bias 1981 F
Bryan and Gibbs 1983 F
Burrell and Welhs 1983 L
Harbo and Birtwell 1978 L
McIntyre 1979 L
Perttila et al. 1982 F
Thompson and Paton 1976 L

g. Processing oil/gas

Malins et al. 1980 F

h. Sewage disposal

Harbo and Birtwell 1978 L
Lehmann 1975 R
Long 1982 R
Malins et al. 1980 F
McIntyre 1979 L
Servizi et al. 1978 L

i. Solid waste disposal

Bernard 1976 R
Bias 1981 F
Burks and Engler 1978 F *
Castilla and Nealler 1978 F
Eagle et al. 1978 F
Hirsch et al. 1978 F
Hoff et al. 1982 L
Lehmann 1975 R
Morton 1977 R
Murray and Norton 1982 F
Norton et al. 1981 F
Peddicord and McFarland 1978 L
Pequegnat et al. 1978
Perttila et al. 1982 F
Stern and Stickle 1978 R
Wright 1978 F

j. Transport of personnel/equipment/material - water

Young et al. 1979 F

16. Change in levels of chlorinated compounds other than biocides:

a. Dredging

Brannon 1978 R
Burks and Engler 1978 F *
Long 1982 R
Peddicord and McFarland 1978 L
Wright 1978 F

b. Drilling

Land 1974 R
Peddicord and McFarland 1978 L

c. Processing lumber/kraft/pulp

Kuski and Walter 1977 R *

d. Processing oil/gas

Malins et al. 1980 F

e. Sewage disposal

Davis and Middaugh 1975 R
Erickson and Foulk 1980 L
Lehmann 1975 R
Long 1982 R
Malins et al. 1980 F
Martens and Servizi 1975 L
Servizi and Martens 1974 F
Servizi et al. 1978 L
Stober et al. 1980 L
Tsai 1975 R

f. Solid waste disposal

Brannon 1978 R
Burks and Engler 1978 F *
Lehmann 1975 R
Peddicord and McFarland 1978 L
Wright 1978 F

g. Water regulation/withdrawal/irrigation

Goldman and Quinby 1979 F

17. Introduction of biocides:

a. Channelizing waterways

Darnell et al. 1976 R

b. Chemical application

Buchanan et al. 1970 L
Koski and Walter 1977 R *

c. Dredging

Brannon 1978 R
Burks and Engler 1978 F *
Darnell et al. 1976 R
Stern and Stickle 1978 R
Wright 1978 F

d. Drilling

Land 1974 R

e. Solid waste disposal

Brannon 1978 R
Burks and Engler 1978 F *
Murray and Norton 1982 F
Stern and Stickle 1978 R
Wright 1978 F

18a. Change in levels of other toxic compounds--bark or log leachates:

a. Clearing and tree harvest

Buchanan et al. 1976 L *
Graham and Schaumburg 1969 F *

b. Log storage/transport

Buchanan et al. 1976 L *
Duval et al. 1980 R
Edgell and Ross 1983 R
Ellis 1973 F
Graham and Schaumburg 1969 F *
Koski and Walter 1977 R *
Meyers 1977 F
O'Clair 1983 F
Pacific N.W. Poll. Control Council 1971 R
Pease 1974 R
Schaumburg 1973 F
Schultz and Berg 1976 F
Sedlak 1982 R
U.S. Environmental Protection Agency 1975a R

- c. Processing lumber/kraft/pulp
 - Schmiege 1980 R
- 18b. Change in levels of other toxic compounds--sulfurous compounds:
 - a. Log storage/transport
 - Duval et al. 1980 R
 - b. Processing lumber/kraft/pulp
 - Greer 1976 F
 - c. Sewage disposal
 - Read et al. 1983 F
 - Tsai 1975 R
 - d. Solid waste disposal
 - Karna 1978 F
 - Pratt et al. 1973 F
- 18c. Change in levels of other toxic compounds--other:
 - a. Dredging
 - Burks and Engler 1978 F *
 - Hirsch et al. 1978 F
 - Wright 1978 F
 - b. Drilling
 - Carls and Rice 1980 L
 - Carls and Rice 1984 L
 - Czyzewska 1976 L
 - Land 1974 R
 - Lawrence and Scherer 1974 L
 - c. Filling (aquatic and wetland habitats):
 - Carstea et al. 1975 R *
 - Dunn and Fee 1979 F *
 - Sigman 1985 R
 - Uthe et al. 1984 F *
 - d. Log storage/transport

Koski and Walter 1977 R *

e. Processing lumber/kraft/pulp

Czyzewska 1976 L
Gordon and Servizi 1974 F
Greer 1976 F
McLeay et al. 1979 L
Schmiege 1980 R

f. Processing oil/gas

Bourne et al. 1981 L
Malins et al. 1980 F

g. Sewage disposal

Czyzewska 1976 L
Gordon and Servizi 1974 F
Malins et al. 1980 F
McNulty 1970 F
Servizi et al. 1978 L
Tsai 1975 R

h. Solid waste disposal

Burks and Engler 1978 F *
Hirsch et al. 1978 F
Murray and Norton 1982 F
Wright 1978 F

i. Transport of oil/gas/water - water

Bourne et al. 1981 L
Czyzewska 1976 L

19. Change in levels of hydrocarbons:

a. Dredging

Burks and Engler 1978 F *
Hirsch et al. 1978 F
Morton 1977 R

b. Drilling

Babcock 1985 L
Baden 1982 L
Brodersen et al. 1977 L
Cameron and Smith 1980 L

Canevari and Lindblom 1976 R
 Carls and Rice 1984 L
 Collodi et al. 1984 L
 Crothers 1983 F
 Edwards 1978 L
 Fletcher et al. 1981 L
 Gerber et al. 1980 L
 Griffiths et al. 1982 L
 Hartwick et al. 1982 F
 Houghton and Beyer 1980 L
 Hsiao 1978 L
 Hsiao et al. 1978 L
 Karinen 1980 R
 Korn and Rice 1981 L
 Korn et al., in press L
 Lees and Houghton 1980 F
 Linden 1978 L
 Lonning and Hagstrom 1976 L
 Malins 1977 F
 Malins and Hodgins 1981 R
 Malins et al. 1981 L
 McKeown 1981 L
 Mecklenburg et al. 1977 L
 Moles 1980 L
 Moles and Rice 1983 L
 Moles et al. 1979 L
 Moles et al. 1981 L
 Neff and Anderson 1981 R
 Norton and Franklin 1980 F
 O'Clair and Rice 1985 L
 Olla and Bejda 1983 L
 Ordzie and Garofalo 1981 L
 Percy 1976 F
 Rice 1981 R
 Rice et al. 1975 L
 Rice et al. 1976a L
 Rice et al. 1976b L
 Rice et al. 1977a L
 Rice et al. 1977b L
 Rice et al. 1979 L
 Rice et al. 1981 L
 Rice et al. 1984 R
 Sekerah and Foy 1978 L
 Shaw et al. 1981 L
 Sprague et al. 1982 R
 Starr et al. 1981 R
 Stickle et al. 1982 L
 Stickle et al. 1984 L
 Taylor and Karinen 1977 L
 Thomas and Rice 1975 L
 Thomas and Rice 1979 L

Thomas and Rice 1981 L
 Thomas and Rice 1982 L *
 Thomas and Rice, in press L
 Tornberg et al. 1980 F
 Varanasi et al. 1981 L
 Wilson 1974 L
 Wilson 1976 L
 Wilson 1977 L

c. Filling (aquatic and wetland habitats):

Borthwick and Patrick 1982 L *
 Dunn and Fee 1979 F *
 Mix et al. 1977 F *
 Sigman 1985 R
 Thomas and Rice 1982 L *
 Uthe et al. 1984 F *

d. Processing oil/gas

Babcock 1985 L
 Bourne et al. 1981 L
 Dunn and Young 1976 F
 Long 1982 R
 Malins et al. 1980 F
 Mix et al. 1977 F *
 Ordzie and Garofalo 1981 L
 Starr et al. 1981 R

e. Sewage disposal

Malins et al. 1980 F

f. Solid waste disposal

Burks and Engler 1978 F *
 Hirsch et al. 1978 F
 Morton 1977 R
 Pequegnat et al. 1978

g. Transport of oil/gas/water - land,ice

Mix et al. 1977 F *

h. Transport of oil/gas/water - water

Atlas et al. 1978 L
 Babcock 1985 L
 Baden 1982 L
 Battershill and Bergquist 1982 F
 Blanchard 1981 F

Bonsdorff 1981 F
 Boucher 1985 F
 Bourne et al. 1981 L
 Brodersen et al. 1977 L
 Cabioch et al. 1981 R
 Cameron and Smith 1980 L
 Canevari and Lindblom 1976 R
 Chasse 1981 F
 Collodi et al. 1984 L
 Conan and Friha 1981 F
 Crothers 1983 F
 Desaunay 1981 F
 Dunn and Young 1976 F
 Edwards 1978 L
 Feder et al. 1976 F
 Fletcher et al. 1981 L
 Floc'h and Diouris 1981 F
 Franklin and Lloyd 1982 L
 Friocourt et al. 1981 F
 Griffiths et al. 1982 L
 Griswold 1981 F
 Grose and Mattson 1977 F
 Gundlach et al. 1983 F
 Hartwick et al. 1982 F
 Hsiao 1978 L
 Hsiao et al. 1978 L
 Johansson et al. 1980 F
 Kaas 1981 F
 Karinen 1980 R
 Kineman et al. 1980 R
 Korn and Rice 1981 L
 Korn et al. 1979 L
 Korn et al., in press L
 Laseter et al. 1981 F
 Le Moal and Quillien-Monot 1981 F
 Leglise and Raguenes 1981 F
 Linden 1978 L
 Long 1982 R
 Lonning and Hagstrom 1976 L
 Lopez et al. 1981 F
 Malins 1977 F
 Malins and Hodgins 1981 R
 Malins et al. 1981 L
 McKeown 1981 L
 Mecklenburg et al. 1977 L
 Miossec 1981 F
 Mix et al. 1977 F *
 Moles 1980 L
 Moles and Rice 1983 L
 Moles et al. 1979 L
 Moles et al. 1981 L

Neff and Anderson 1981 R
 Norton and Franklin 1980 F
 O'Clair and Rice 1985 L
 Olla and Bejda 1983 L
 Ordzie and Garofalo 1981 L
 Percy 1976 F
 Rice 1981 R
 Rice et al. 1975 L
 Rice et al. 1976a L
 Rice et al. 1976b L
 Rice et al. 1977a L
 Rice et al. 1977b L
 Rice et al. 1979 L
 Rice et al. 1981 L
 Rice et al. 1984 R
 Sekerah and Foy 1978 L
 Shaw 1984 R
 Shaw et al. 1981 L
 Sprague et al. 1982 R
 Starr et al. 1981 R
 Stickle et al. 1982 L
 Stickle et al. 1984 L
 Taylor and Karinen 1977 L
 Thomas and Rice 1975 L
 Thomas and Rice 1979 L
 Thomas and Rice 1981 L
 Thomas and Rice 1982 L *
 Thomas and Rice, in press L
 Topinka and Tucker 1981 F
 Varanasi et al. 1981 L
 Wilson 1974 L
 Wilson 1976 L
 Wilson 1977 L

i. Transport of personnel/equipment/material - land,ice

Mix et al. 1977 F *
 Rice 1981 R

j. Transport of personnel/equipment/material - water

Bourne et al. 1981 L
 Long 1982 R
 Mix et al. 1977 F *

20. Change in levels of nutrients:

a. Clearing and tree harvest

Koski and Walter 1977 R *

b. Dredging

Burks and Engler 1978 F *
Morton 1977 R
Stern and Stickle 1978 R

c. Filling (aquatic and wetland habitats):

Anderson et al. 1981a F *
Anderson et al. 1981b F *
Anderson et al. 1981c F *
Cardwell et al. 1980b F *
Carstea et al. 1975 R *
Elgershuizen 1981 F
Heckman 1984 F *
Nece et al. 1975 F *
Trent et al. 1976 F *

d. Grading/plowing

Koski and Walter 1977 R *

e. Log storage/transport

Schaumburg 1973 F

f. Processing minerals (including gravel)

McIntyre 1979 L

g. Sewage disposal

Evelyn 1972 F
Jenkins 1978 F
Lehmann 1975 R
McIntyre 1979 L
McIntyre and Johnston 1975 F
McNulty 1970 F
Read et al. 1983 F
Rozengurt and Herz 1981 R

h. Solid waste disposal

Bechtel 1979 F
Brickell and Goering 1971 F
Burks and Engler 1978 F *
Champ et al. 1981 R
Eagle et al. 1978 F
Lehmann 1975 R
Malick et al. 1971 F
Morton 1977 R

Stern and Stickle 1978 R
Stewart and Tangerone 1977 F

21. Introduction or removal of species:

a. Dredging

Sykes and Hall 1970 F
Wright 1978 F

b. Filling (aquatic and wetland habitats):

Clewell et al. 1976 F
Lees et al. 1981 F *
Mulvihill et al. 1980 R *
Washington Dept. of Fisheries 1971 R

c. Human disturbance

Beauchamp and Gowing 1982 F

d. Sewage disposal

McIntyre and Johnston 1975 F

e. Solid waste disposal

Wright 1978 F

22. Artificial attractant to biological organisms:

a. Blasting

Jehl et al. 1980 R

b. Dredging

Craig 1985 F

c. Drilling

Hawkins 1973 R
Lawrence and Scherer 1974 L

d. Filling (aquatic and wetland habitats):

Salo et al. 1980 F *

e. Human disturbance

Hawkins 1973 R

f. Solid waste disposal

Bechtel 1979 F

Champ et al. 1981 R

Fisheries Research Institute 1971 F

Malick et al. 1971 F

Freshwater Fish

This section provides citations pertaining to impacts on freshwater fish or their habitats. Table 5 is a summary of the activities and impacts for which documentation was located. Impact categories for which documentation has been located are listed in the same order as they are found in table 5. Users should note that no documentation reported for some activity/impact categories may reflect either a real absence of research pertaining to that topic or a lack of completeness of this database, and does not necessarily imply that the activity does not result in adverse impacts to aquatic resources. Impact categories for which no documentation was located are as follows:

Change in level of salinity

Table 5. Summary of the Literature for Defined Activity/Impact Categories: Freshwater Fish

Impact	Activity																		
	Blasting	Burning	Channelizing waterways	Chemical application	Clearing and tree harvest	Draining	Dredging	Drilling	Fencing (aquatic and wetland habitats)	Filling (terrestrial)	Grading/plowing	Grazing	Human disturbance	Log storage/transport	Netting	Processing geothermal energy	Processing lumber/kraft/pulp	Processing minerals	Processing oil/gas
Change in water temperature	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Change in depth or velocity of water	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Change in turbidity or suspended sediments	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Addition of substrate materials	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Removal of substrate materials	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Physical disturbance of substrate materials	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Alteration of natural cover:																			
Riparian vegetation	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Aquatic vegetation	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Overhanging bank or shoreline	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Addition of physical barriers:																			
Impoundments	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Diversions	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Partial obstructions	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Other	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Increase in hydrostatic pressure or noise	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Impingement or entrainment or entanglement	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Physical trampling or crushing	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Change in level of dissolved oxygen, nitrogen	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Change in levels of pH, alkalinity, or hardness	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Change in level of salinity	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Change in levels of heavy metals	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Change in levels of chlorinated compounds	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Introduction of biocides	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Change in levels of other toxic compounds:																			
Bark or log leachates	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Sulfurous compounds	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Other	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Change in levels of hydrocarbons	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Change in levels of nutrients	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Introduction or removal of species	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Artificial attractant to biological organisms	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X

X - Documented impact

1. Change in water temperature:

a. Burning

Everest and Harr 1982 R *

Gibbons and Salo 1973 R *

Tiedemann et al. 1979 R

b. Channelizing waterways

Anderson and Broekstra 1977 F

Darnell et al. 1976 R

Hansen 1971 F *

Hansen and Muncy 1971 F

Hathaway 1978 F *

Hendrick 1976 F

Henegar and Harmon 1971 R

Hill 1976 R

Huish and Pardue 1978 F

Karr and Schlosser 1977 R *

Little 1973a R

Little 1973b R *

Lund 1976 F *

Mecum 1984 F *

Norton et al. 1978 F *

O'Rear 1975 F *

Parrish et al. 1978 R *

Platts and Rinne 1985 R

Schmal and Sanders 1978 F *

Shields 1982 R

Shields and Palermo 1982 R

Simpson et al. 1982 R *

Stern and Stern 1980a R

Stern and Stern 1980b R

Stoeckeler and Voskuil 1959 F

Swales 1982 R

Tarplee et al. 1971 F *

Thackston and Sneed 1982 R

White 1973 R

White and Brynildson 1967 R

c. Chemical application

Norris et al. 1983 R

d. Clearing and tree harvest

Bachman 1958 F *

Barrick 1984 F *

Barton et al. 1985 F *

Bell 1986 R

Bottom et al. 1985 R *

Brazier and Brown 1973 F *

Brett et al. 1982 L
 Brown (G.W.) 1972 R *
 Brown (G.W.) and Krygier 1970 F *
 Burns 1972 F *
 Bustard and Narver 1975b F
 Cederholm 1977 R *
 Chamberlin 1982 R *
 Corbett et al. 1978 R *
 Dryden and Stein 1975 R *
 Elliott 1986 R *
 Gibbons and Salo 1973 R *
 Graynoth 1979 F *
 Hall and Lantz 1969 F *
 Harris 1973 F *
 Harris 1977 F *
 Hartman and Holtby 1982 R
 Hartman and Leahy 1983 F
 Hartman et al. 1982 F *
 Hartman et al. 1983 R *
 Hartman et al. 1984 F *
 Heming 1982 L *
 Heming et al. 1982 L *
 Holtby and Hartman 1982 F *
 Karr and Schlosser 1977 R *
 Koski and Walter 1977 R *
 Lantz 1971b R
 Meehan 1974 R *
 Murphy 1985 F
 Narver 1971 R *
 Narver 1972 F *
 Oregon Wildlife Commission 1974 *
 R and M Consultants 1977 R *
 Reiser and Bjornn 1979 R *
 Ringler and Hall 1975 F *
 Rishel et al. 1982 F *
 Ruth and Harris 1975 R *
 Schwan et al. 1985 R *
 Scrivener and Andersen 1984 F *
 Servizi and Jensen 1977 L
 Silsbee and Larson 1983 F *
 Toews and Brownlee 1981 R *
 Tyler and Gibbons 1973 F *
 U.S. Environmental Protection Agency 1975b R *
 USACRREL 1980 F *

e. Draining

Hill 1976 R
 Little 1973a R
 Little 1973b R *
 USACRREL 1980 F *

f. Dredging

ADF&G 1983 R
Caplice 1959 F
Darnell et al. 1976 R
Woodward-Clyde Consultants 1980 F

g. Filling (aquatic and wetland habitats):

Moulton et al. 1985 F *

h. Grading/plowing

Bachman 1958 F *
Barton et al. 1985 F *
Bell 1986 R
Brazier and Brown 1973 F *
Brett et al. 1982 L
Burns 1972 F *
Bustard and Narver 1975b F
Chamberlin 1982 R *
Corbett et al. 1978 R *
Dryden and Stein 1975 R *
Elliott 1986 R *
Everest and Harr 1982 R *
Gibbons and Salo 1973 R *
Harris 1973 F *
Hartman and Holtby 1982 R
Hartman et al. 1983 R *
Heming et al. 1982 L *
Karr and Schlosser 1977 R *
Koski and Walter 1977 R *
Meehan 1974 R *
Narver 1972 F *
Oregon Wildlife Commission 1974 *
Reiser and Bjornn 1979 R *
Ringler and Hall 1975 F *
Ruth and Harris 1975 R *
Schwan et al. 1985 R *
Servizi and Jensen 1977 L
USACRREL 1980 F *
USFWS 1982 R

i. Grazing

Heming 1982 L *
Heming et al. 1982 L *
Platts 1981b R
Platts and Rinne 1985 R

j. Processing geothermal energy

Suter 1978

k. Processing minerals (including gravel)

ADF&G 1983 R
Brown (R.J.) and Baker 1975 R *
Caplice 1959 F
Heming et al. 1982 L *
Karr and Schlosser 1977 R *
Woodward-Clyde Consultants 1980 F

l. Sewage disposal

Tsai 1970 F

m. Stream crossing - fords

Day and Carvell 1979 F

n. Stream crossing - structures

USACRREL 1980 F *
USFWS 1982 R

o. Transport of personnel/equipment/material - land,ice

Day and Carvell 1979 F
R and M Consultants 1977 R *

p. Water regulation/withdrawal/irrigation

Becker et al. 1982 F
Brett et al. 1982 L
Ciliberti 1980 F
Decker-Hess and McMullin 1983 F
Geen and Andrew 1961 F
Heming 1982 L *
Heming et al. 1982 L *
Lister and Walker 1962 F
Reiser 1981 F
Reiser and Ramey 1985 R
Servizi and Jensen 1977 L
Winger 1972 F

2. Change in depth or velocity of water:

a. Burning

Everest and Harr 1982 R *
Gibbons and Salo 1973 R *

Lutz 1956 R
 Megahan and Molitor 1975 F
 Rice et al. 1972 R *
 Viereck and Schandelmeir 1980 R
 Wright 1981 R

b. Channelizing waterways

Antoine and Benson-Evans 1982 F
 Babcock 1982 F
 Baldes 1973 F *
 Barstow 1971 F *
 Barton and Winger 1973 F
 Beland 1953 F *
 Bell 1986 R
 Benson and Weithman 1980 R
 Bianchi and Marcoux 1976 F
 Bottom et al. 1985 R *
 Bradt and Wieland 1978 F
 Brown (R.J.) and Baker 1975 R *
 Bulkley 1976 F *
 Bulkley et al. 1976 R
 Campbell et al. 1972 F *
 Caplice 1959 F
 Carline and Klosiewski 1985 F
 Cederholm 1972 F *
 Cederholm and Koski 1977 F *
 Choate 1972 F *
 Chutter 1969 R *
 Congdon 1971 F *
 Cooper and Wesche 1976 R
 Darnell et al. 1976 R
 Dodge et al. 1976 F
 Duval et al. 1976 F *
 Edwards 1977 F
 Edwards et al. 1984 F
 Elliott 1980 F *
 Elser 1968 F *
 Emerson 1971 F *
 Etnier 1972 F *
 Golden and Twilley 1976 F
 Griswold et al. 1978 F
 Groen and Schmulbach 1978 F *
 Hansen 1971 F *
 Hansen and Muncy 1971 F
 Hasfurther 1985 R *
 Hendrick 1976 F
 Henegar and Harmon 1971 R
 Hill 1976 R
 Huggins and Moss 1975 F
 Huish and Pardue 1978 F

Hunt and Graham 1972 F
 Irizarry 1969 F
 Johnson et al. 1974 F
 Keefer 1977 F *
 Kelly 1975 F
 Kuenzler et al. 1977 F *
 Little 1973a R
 Little 1973b R *
 Luedtke et al. 1976 F
 Lund 1976 F *
 McMahon et al. 1972 F *
 Mecum 1984 F *
 Menzel and Fierstine 1976 F
 Morris et al. 1968 F *
 Moyle 1976 F *
 Norton et al. 1978 F *
 Nunnally 1978 R
 Parrish et al. 1978 R *
 Peters and Alvord 1964 R
 Platts and Rinne 1985 R
 Ritter 1979 F
 Schlosser 1982 F
 Schoof 1980 R
 Shields 1982 R
 Shields and Palermo 1982 R
 Simpson et al. 1982 R *
 Stern and Stern 1980a R
 Stern and Stern 1980b R
 Swales 1982 R
 Swales and O'Hara 1980 R
 Tarplee et al. 1971 F *
 Thackston and Sneed 1982 R
 Trautman and Gartman 1974 F *
 U.S. Dept. of Transportation 1979 R
 USFWS 1980 R
 Wesche 1985 R *
 White 1973 R
 White and Brynildson 1967 R
 Winger 1972 F
 Witten and Bulkley 1975 F
 Wolf et al. 1972 F *
 Woods 1977 F
 Wydoski 1978 R
 Wydoski and Helm 1980 F
 Yearke 1971 F *
 Zimmer and Bachmann 1976 F
 Zimmer and Bachmann 1978 F *
 Zimmerman et al. 1967 F

c. Clearing and tree harvest

Anderson 1971 R
 Bachman 1958 F *
 Beschta 1978 F *
 Beschta 1979 F *
 Bottom et al. 1985 R *
 Brannon 1965 L
 Burns 1972 F *
 Bustard and Narver 1975b F
 Cederholm 1977 R *
 Chamberlin 1982 R *
 Chutter 1969 R *
 Elliott 1986 R *
 Gibbons and Salo 1973 R *
 Harr and McCorison 1979 F
 Harr et al. 1975 F
 Harr et al. 1979 F *
 Harr et al. 1982 F
 Harris 1973 F *
 Harris 1977 F *
 Hartman and Holtby 1982 R
 Hartman et al. 1982 F *
 Hess 1984 F *
 Holtby and Hartman 1982 F *
 Hsieh 1970 F
 Koski and Walter 1977 R *
 Krygier and Harr 1972 F
 Lull 1959 F *
 Meehan 1974 R *
 Moring 1982 F *
 Myren and Ellis 1984 F *
 Narver 1971 R *
 Narver 1972 F *
 Patric and Aubertin 1977 F
 Patric and Gorman 1978 F
 R and M Consultants 1977 R *
 Rothacher 1970 F *
 Ruth and Harris 1975 R *
 Schwan et al. 1985 R *
 Swindel et al. 1983 F
 Toews and Brownlee 1981 R *
 Tschaplinski and Hartman 1983 F *

d. Draining

Barstow 1971 F *
 Beland 1953 F *
 Campbell et al. 1972 F *
 Choate 1972 F *
 Hill 1976 R
 Little 1973a R
 Little 1973b R *

Trautman and Gartman 1974 F *

e. Dredging

ADF&G 1983 R
Brown (R.J.) and Baker 1975 R *
Darnell et al. 1976 R
Woodward-Clyde Consultants 1980 F

f. Filling (aquatic and wetland habitats):

Barton and Winger 1973 F
Bottom et al. 1985 R *
Bulkley 1976 F *
Carline and Klosiewski 1985 F
Cooper and Wesche 1976 R
Edwards 1977 F
Edwards et al. 1984 F
Elser 1968 F *
Gore and Johnson 1980 F
Johnson et al. 1974 F
Luedtke et al. 1976 F
Lund 1976 F *
Mecum 1984 F *
Nunnally 1978 R
Peters and Alvord 1964 R
Platts and Rinne 1985 R
Saunders and Smith 1962 F
Schoof 1980 R
Sheeter and Claire 1981 F
Striffler 1960 R
Swales and O'Hara 1980 R
U.S. Dept. of Transportation 1979 R
Witten and Bulkley 1975 F
Woods 1977 F

g. Grading/plowing

Anderson 1971 R
Bachman 1958 F *
Beschta 1978 F *
Beschta 1979 F *
Bottom et al. 1985 R *
Brannon 1965 L
Burns 1972 F *
Burroughs et al. 1972 F *
Bustard and Narver 1975b F
Chamberlin 1982 R *
Chutter 1969 R *
Cooper and Wesche 1976 R
Elliott 1986 R *

Everest and Harr 1982 R *
 Harr et al. 1975 F
 Harris 1973 F *
 Hartman and Holtby 1982 R
 Hess 1984 F *
 Hsieh 1970 F
 Irizarry 1969 F
 Koski and Walter 1977 R *
 Krygier and Harr 1972 F
 Meehan 1974 R *
 Megahan 1972 F *
 Narver 1972 F *
 Peters and Alvord 1964 R
 Ruth and Harris 1975 R *
 Schwan et al. 1985 R *
 Swindel et al. 1983 F
 USFWS 1982 R

h. Grazing

Cooper and Wesche 1976 R
 May and Davis 1981 R
 Platts 1981a F
 Platts 1981b R
 Platts and Rinne 1985 R

i. Processing minerals (including gravel)

ADF&G 1983 R
 Brannon 1965 L
 Brown (R.J.) and Baker 1975 R *
 Caplice 1959 F
 Cooper and Wesche 1976 R
 Irizarry 1969 F
 Martin and Platts 1981 R
 Singleton et al. 1981 F
 Woodward-Clyde Consultants 1980 F

j. Stream crossing - fords

Elliott 1980 F *

k. Stream crossing - structures

Anderson and Bryant 1980 R
 Bell 1986 R
 Bryant 1981 F
 Dane 1978a R
 Dane 1978b R
 Elliott 1982 F
 Harr et al. 1975 F

MacPhee and Watts 1975 F
 Oregon Wildlife Commission 1974 *
 Peters and Alvord 1964 R
 Saskatchewan Dept. of the Environ. 1981 R
 USFWS 1982 R
 Watts 1974 R

1. Transport of personnel/equipment/material - land,ice

R and M Consultants 1977 R *

m. Water regulation/withdrawal/irrigation

Antoine and Benson-Evans 1982 F
 Bartsch 1960 R *
 Becker et al. 1982 F
 Bell 1986 R
 Bodaly and Lesack 1984 F
 Bodaly et al. 1984a F *
 Bodaly et al. 1984b F
 Bottom et al. 1985 R *
 Brannon 1965 L
 Ciliberti 1980 F
 Decker-Hess and McMullin 1983 F
 Hall 1979 F
 Hesse and Newcomb 1982 F
 Keefer 1977 F *
 Kraft 1972 F *
 Lister and Walker 1962 F
 McMaster et al. 1977 F
 Morris et al. 1968 F *
 Mosley 1982 F
 Reiser 1981 F
 Reiser and Ramey 1985 R
 Reiser and White 1983 L
 Trautman and Gartman 1974 F *
 White et al. 1980 L
 Winger 1972 F
 Wydoski and Helm 1980 F

3. Change in turbidity or suspended sediments:

a. Burning

Everest and Harr 1982 R *
 Lyon et al. 1978 R
 Rice et al. 1972 R *
 Stednick et al. 1982 F
 Tiedemann et al. 1979 R
 Viereck and Dyrness 1979 F

Viereck and Schandelmeir 1980 R

b. Channelizing waterways

Arner et al. 1976 F *
Babcock 1982 F
Barclay 1980 F *
Barton and Winger 1973 F
Beland 1953 F *
Bell 1986 R
Bradt and Wieland 1978 F
Brown (R.J.) and Baker 1975 R *
Caplice 1959 F
Chapman and Knudsen 1980 F *
Cordone and Kelly 1961 R
Darnell et al. 1976 R
Dept. of Envir. Dept. of Fish. and Oceans 1983 R
Hall and McKay 1983 R *
Hansen 1971 F *
Hansen and Muncy 1971 F
Hasfurth 1985 R *
Henegar and Harmon 1971 R
Hill 1976 R
Irizarry 1969 F
Karr and Schlosser 1977 R *
Kelly 1975 F
Kuenzler et al. 1977 F *
Little 1973a R
Little 1973b R *
Lloyd 1985 R *
Luedtke et al. 1976 F
Lund 1976 F *
Mecum 1984 F *
Parrish et al. 1978 R *
Phillips 1971 R *
Rees 1959 F *
Reger and Helm 1982 F
Ritter 1979 F
Schmal and Sanders 1978 F *
Shields 1982 R
Shields and Palermo 1982 R
Sigler et al. 1984 L *
Simpson et al. 1982 R *
Stern and Stern 1980a R
Stern and Stern 1980b R
Tarplee et al. 1971 F *
Thackston and Sneed 1982 R
Trautman and Gartman 1974 F *
Whitaker et al. 1979 F *
White 1973 R
Winger 1972 F

Wydoski 1978 R

c. Clearing and tree harvest

Adams and Beschta 1980 F
Aldrich and Johnson 1979 F *
Anderson 1971 R
Bachman 1958 F *
Barrick 1984 F *
Barton et al. 1985 F *
Bartsch 1960 R *
Bell 1986 R
Beschta 1978 F *
Beschta 1979 F *
Beschta 1980 F
Bjornn et al. 1974 F *
Bjornn et al. 1977 F
Brown (G.W.) 1972 R *
Burns 1970 F *
Burns 1972 F *
Bustard and Narver 1975a F
Bustard and Narver 1975b F
Chamberlin 1982 R *
Corbett et al. 1978 R *
Cordone and Kelly 1961 R
Crouse et al. 1981 F *
Culp and Davies 1983 F *
Cummins 1985 F *
Dryden and Stein 1975 R *
Fredriksen et al. 1975 R *
Gibbons and Salo 1973 R *
Gradall and Swenson 1982 L
Hall and Lantz 1969 F *
Hall and McKay 1983 R *
Hartman and Holtby 1982 R
Hartman et al. 1983 R *
Hausle and Coble 1976 L
Holtby and Hartman 1982 F *
Karr and Schlosser 1977 R *
Koski and Walter 1977 R *
Koski et al. 1984 F *
Kramer and Smith 1965 *
Lantz 1971a R *
Lloyd 1985 R *
Lotspeich and Helmers 1974 R
McCabe and O'Brien 1983 L
McNeil and Ahnell 1964 F *
Meehan 1974 R *
Meehan and Swanston 1977 F
Megahan and Kidd 1972 F *
Murphy et al. 1981 F *

Narver 1971 R *
 Newbold et al. 1980 F *
 Noggle 1978 L *
 Oregon Wildlife Commission 1974 *
 Patric and Aubertin 1977 F
 Phillips 1971 R *
 Platts and Megahan 1975 F *
 R and M Consultants 1977 R *
 Reiser and Bjornn 1979 R *
 Rice et al. 1972 R *
 Ruth and Harris 1975 R *
 Schwan et al. 1985 R *
 Scrivener and Brownlee 1982 R *
 Sheridan and McNeil 1968 F
 Sigler et al. 1984 L *
 Silsbee and Larson 1983 F *
 Swanson and Lienkaemper No date R *
 Toews and Brownlee 1981 R *
 Toews and Moore 1982 F *
 U.S. Environmental Protection Agency 1975b R *
 U.S. Forest Service et al. 1976 F
 USACRREL 1980 F *
 Welch et al. 1977 F *
 Wilson 1960 R *
 Wydoski 1978 R

d. Draining

Hill 1976 R
 Little 1973a R
 Little 1973b R *
 Lotspeich and Helmers 1974 R
 Noggle 1978 L *
 Trautman and Gartman 1974 F *
 USACRREL 1980 F *

e. Dredging

ADF&G 1983 R
 Bell 1986 R
 Birtwell et al. 1984 F
 Bjornn et al. 1977 F
 Bowden et al. 1983 R
 Brown (R.J.) and Baker 1975 R *
 Campbell 1954 F
 Cordone and Kelly 1961 R
 Darnell et al. 1976 R
 Dept. of Envir. Dept. of Fish. and Oceans 1983 R
 Gore and Johnson 1980 F
 Gradall and Swenson 1982 L
 Hall and McKay 1983 R *

Harvey et al. 1982 F
 Hausle and Coble 1976 L
 LaPerriere et al. 1983 F
 Lloyd 1985 R *
 Mathers et al. 1981 F
 McCabe and O'Brien 1983 L
 McLeay et al. 1983 F *
 McLeay et al. 1984 L *
 Meehan and Swanston 1977 F
 Noggle 1978 L *
 Pearson and Jones 1975 F *
 Peddicord and McFarland 1978 L
 Phillips 1971 R *
 Redding and Schreck 1980 L *
 Rees 1959 F *
 Sigler et al. 1984 L *
 Simmons 1984 F
 Wagener 1984 F
 Wilson 1960 R *
 Woodward-Clyde Consultants 1980 F
 Wydoski 1978 R

f. Drilling

Alexander and Hansen 1977 F
 Peddicord and McFarland 1978 L
 Suter 1978

g. Filling (aquatic and wetland habitats):

Cordone and Kelly 1961 R
 Luedtke et al. 1976 F
 Moulton et al. 1985 F *

h. Grading/plowing

ADEC and R and M Consultants 1980 R *
 Adams and Beschta 1980 F
 Aldrich and Johnson 1979 F *
 Anderson 1971 R
 Bachman 1958 F *
 Barrick 1984 F *
 Barton 1977 F *
 Bell 1986 R
 Beschta 1978 F *
 Beschta 1979 F *
 Beschta 1980 F
 Bjornn et al. 1974 F *
 Bjornn et al. 1977 F
 Brown (G.W.) 1972 R *
 Burns 1970 F *

Burns 1972 F *
 Burton et al. 1976 F
 Bustard and Narver 1975a F
 Bustard and Narver 1975b F
 Cederholm 1977 R *
 Cederholm et al. 1981 F *
 Chamberlin 1982 R *
 Cowen 1974 R *
 Crouse et al. 1981 F *
 Culp and Davies 1983 F *
 Cummins 1985 F *
 Dept. of Envir. Dept. of Fish. and Oceans 1983 R
 Dryden and Stein 1975 R *
 Elliott 1986 R *
 Everest and Harr 1982 R *
 Fredriksen et al. 1975 R *
 Gibbons and Salo 1973 R *
 Gradall and Swenson 1982 L
 Hall and McKay 1983 R *
 Hartman and Holtby 1982 R
 Hartman et al. 1983 R *
 Hausle and Coble 1976 L
 Irizarry 1969 F
 Karr and Schlosser 1977 R *
 King and Ball 1964 F
 Kochenderfer 1970 R
 Koski and Walter 1977 R *
 Koski et al. 1984 F *
 LaPerriere et al. 1983 F
 Lantz 1971a R *
 Larse 1971 R *
 Leedy and Adams 1982 R
 Lenat et al. 1981 F *
 Lloyd 1985 R *
 Lotspeich 1971 R *
 Lotspeich and Helmers 1974 R
 McCabe and O'Brien 1983 L
 McLeay et al. 1983 F *
 McLeay et al. 1984 L *
 McNeil and Ahnell 1964 F *
 Meehan 1974 R *
 Meehan and Swanston 1977 F
 Megahan and Kidd 1972 F *
 Newbold et al. 1980 F *
 Noggle 1978 L *
 Oregon Wildlife Commission 1974 *
 Phillips 1971 R *
 Platts and Megahan 1975 F *
 R and M Consultants 1977 R *
 Redding and Schreck 1980 L *
 Reiser and Bjornn 1979 R *

Rice et al. 1972 R *
 Rosenberg and Snow 1975 R *
 Ruth and Harris 1975 R *
 Saskatchewan Dept. of the Environ. 1981 R
 Schwan et al. 1985 R *
 Scrivener and Brownlee 1982 R *
 Sigler et al. 1984 L *
 Swanson and Lienkaemper No date R *
 Thomas 1985 F
 Toews and Brownlee 1981 R *
 U.S. Environmental Protection Agency 1973 R *
 USACRREL 1980 F *
 USFWS 1982 R
 Wagener 1984 F
 Welch et al. 1977 F *
 Wilson 1960 R *
 Yee and Roelofs 1980 R *

i. Grazing

Chapman and Knudsen 1980 F *
 Cordone and Kelly 1961 R
 Lloyd 1985 R *
 May and Davis 1981 R
 Noggle 1978 L *
 Platts 1981a F
 Wydoski 1978 R

j. Human disturbance

Aukerman and Springer 1976 F
 Barrick 1984 F *

k. Log storage/transport

Oregon Wildlife Commission 1974 *

l. Processing lumber/kraft/pulp

Hall 1969 R
 Kramer and Smith 1965 *

m. Processing minerals (including gravel)

ADF&G 1983 R
 Bell 1986 R
 Birtwell et al. 1984 F
 Bjornn et al. 1977 F
 Bowden et al. 1983 R
 Brown (R.J.) and Baker 1975 R *
 Campbell 1954 F

Caplice 1959 F
 Clarke 1974 R
 Dept. of Envir. Dept. of Fish. and Oceans 1983 R
 Gammon 1970 F
 Gore and Johnson 1980 F
 Hall and McKay 1983 R *
 Harvey et al. 1982 F
 Irizarry 1969 F
 Karr and Schlosser 1977 R *
 LaPerriere et al. 1983 F
 Lloyd 1985 R *
 Lotspeich and Helmers 1974 R
 Martin and Platts 1981 R
 Mathers et al. 1981 F
 McLeay et al. 1983 F *
 McLeay et al. 1984 L *
 Redding and Schreck 1980 L *
 Sigler et al. 1984 L *
 Simmons 1984 F
 Smith and Sykora 1976 L
 Sumner and Smith 1940 F
 Wagener 1984 F
 Weber and Post 1985 F
 Woodward-Clyde Consultants 1980 F
 Wydoski 1978 R

n. Sewage disposal

Hartmann 1983 F
 Tsai 1973 F

o. Solid waste disposal

Peddicord and McFarland 1978 L

p. Stream crossing - fords

Cordone and Kelly 1961 R
 Oregon Wildlife Commission 1974 *

q. Stream crossing - structures

Dryden and Stein 1975 R *
 Lotspeich 1971 R *
 Lotspeich and Helmers 1974 R
 USACRREL 1980 F *
 USFWS 1982 R

r. Transport of oil/gas/water - land, ice

Hok 1969 F

s. Transport of personnel/equipment/material - land,ice

Day and Carvell 1979 F
Hok 1969 F
R and M Consultants 1977 R *

t. Water regulation/withdrawal/irrigation

Ciliberti 1980 F
Geen and Andrew 1961 F
Hesse and Newcomb 1982 F
Reiser and Ramey 1985 R
Reiser and White 1983 L
Trautman and Gartman 1974 F *
Wydoski 1978 R

4. Addition of substrate materials:

a. Burning

Brown (G.W.) and Krygier 1971 F *
Everest and Harr 1982 R *
Megahan and Molitor 1975 F

b. Channelizing waterways

Babcock 1982 F
Baldes 1973 F *
Barclay 1980 F *
Barstow 1971 F *
Barton and Winger 1973 F
Beland 1953 F *
Benson and Weithman 1980 R
Bradt and Wieland 1978 F
Cederholm 1972 F *
Cederholm and Koski 1977 F *
Chutter 1969 R *
Cordone and Kelly 1961 R
Elliott 1980 F *
Emerson 1971 F *
Griswold et al. 1978 F
Hall and McKay 1983 R *
Hansen and Muncy 1971 F
Henegar and Harmon 1971 R
Hill 1976 R
Huish and Pardue 1978 F
Johnson et al. 1974 F
Kelly 1975 F
Little 1973a R
Little 1973b R *

Lund 1976 F *
 Nunnally 1978 R
 Phillips 1971 R *
 Phillips et al. 1975 L *
 Rees 1959 F *
 Reger and Helm 1982 F
 Ritter 1979 F
 Schmal and Sanders 1978 F *
 Schoof 1980 R
 Sheeter and Claire 1981 F
 Shields and Palermo 1982 R
 Simpson et al. 1982 R *
 Stern and Stern 1980a R
 Stern and Stern 1980b R
 Striffler 1960 R
 Swales 1982 R
 Tarplee et al. 1971 F *
 Thackston and Sneed 1982 R
 Timbol and Maciolek 1978 F *
 Trautman and Gartman 1974 F *
 White 1973 R
 White and Brynildson 1967 R
 Winger 1972 F
 Woods 1977 F
 Wydoski and Helm 1980 F
 Yearke 1971 F *

c. Chemical application

Norris et al. 1983 R

d. Clearing and tree harvest

Anderson 1971 R
 Bachman 1958 F *
 Barton et al. 1985 F *
 Bartsch 1960 R *
 Beschta 1978 F *
 Bethlahmy 1967 F
 Bjornn et al. 1974 F *
 Bjornn et al. 1977 F
 Bottom et al. 1985 R *
 Brown (G.W.) 1972 R *
 Brown (G.W.) and Krygier 1971 F *
 Brusven and Prather 1974 L
 Burns 1970 F *
 Cederholm 1977 R *
 Chamberlin 1982 R *
 Chutter 1969 R *
 Cordone and Kelly 1961 R
 Crouse et al. 1981 F *

Culp and Davies 1983 F *
 Elliott 1986 R *
 Fredriksen 1970 F *
 Gibbons and Salo 1973 R *
 Graynoth 1979 F *
 Hall and Lantz 1969 F *
 Hall and McKay 1983 R *
 Harris 1973 F *
 Harris 1977 F *
 Hartman and Holtby 1982 R
 Hartman et al. 1983 R *
 Holtby and Hartman 1982 F *
 Koski and Walter 1977 R *
 Koski et al. 1984 F *
 Kramer and Smith 1965 *
 McNeil and Ahnell 1964 F *
 Meehan 1974 R *
 Meehan and Swanston 1977 F
 Meehan et al. 1985 R
 Megahan and Kidd 1972 F *
 Megahan and Molitor 1975 F
 Moring 1982 F *
 Murphy and Hall 1981 F *
 Narver 1971 R *
 Peterson and Metcalfe 1981 L
 Phillips 1971 R *
 Phillips et al. 1975 L *
 Platts and Megahan 1975 F *
 Ponce and Brown 1974 L *
 Reiser and Bjornn 1979 R *
 Rice et al. 1972 R *
 Ringler and Hall 1975 F *
 Ruth and Harris 1975 R *
 Schwan et al. 1985 R *
 Scrivener and Andersen 1984 F *
 Scrivener and Brownlee 1982 R *
 Sheridan and McNeil 1968 F
 Silsbee and Larson 1983 F *
 Swanson and Lienkaemper No date R *
 Swanston 1969 F *
 Swindel et al. 1983 F
 U.S. Environmental Protection Agency 1975b R *
 Welch et al. 1977 F *
 Wilson 1960 R *
 Wu and Swanston 1980 R *

e. Draining

Hill 1976 R
 Little 1973a R
 Little 1973b R *

Trautman and Gartman 1974 F *

f. Dredging

ADF&G 1983 R
Bartsch 1960 R *
Bjornn et al. 1977 F
Bowden et al. 1983 R
Brusven and Prather 1974 L
Campbell 1954 F
Caplice 1959 F
Cordone and Kelly 1961 R
Hall and McKay 1983 R *
Harvey et al. 1982 F
Johnson 1984b R *
LaPerriere et al. 1983 F
Oregon St. Game Commission et al. 1955 F
Pearson and Jones 1975 F *
Phillips 1971 R *
Phillips et al. 1975 L *
Rees 1959 F *
Shaw and Maga 1943 F
Wagener 1984 F
Wilson 1960 R *

g. Drilling

Alexander and Hansen 1977 F
Didiuk and Wright 1975 L
Peddicord and McFarland 1978 L

h. Filling (aquatic and wetland habitats):

Cordone and Kelly 1961 R

i. Grading/plowing

ADEC and R and M Consultants 1980 R *
Anderson 1971 R
Bachman 1958 F *
Bartsch 1960 R *
Beschta 1978 F *
Bjornn et al. 1974 F *
Bjornn et al. 1977 F
Bottom et al. 1985 R *
Brown (G.W.) and Krygier 1971 F *
Brusven and Prather 1974 L
Burns 1970 F *
Cederholm 1977 R *
Cederholm et al. 1981 F *
Chamberlin 1982 R *

Chutter 1969 R *
 Cordone and Kelly 1961 R
 Crouse et al. 1981 F *
 Culp and Davies 1983 F *
 Elliott 1986 R *
 Everest and Harr 1982 R *
 Fredriksen 1970 F *
 Gibbons and Salo 1973 R *
 Hall and McKay 1983 R *
 Harris 1973 F *
 Hartman and Holtby 1982 R
 Hartman et al. 1983 R *
 King and Ball 1964 F
 Kochenderfer 1970 R
 Koski and Walter 1977 R *
 Koski et al. 1984 F *
 LaPerriere et al. 1983 F
 Lenat et al. 1981 F *
 McCashion and Rice 1983 F *
 McLeay et al. 1983 F *
 McNeil and Ahnell 1964 F *
 Meehan 1974 R *
 Meehan and Swanston 1977 F
 Megahan and Kidd 1972 F *
 Oregon St. Game Commission et al. 1955 F
 Peterson and Metcalfe 1981 L
 Phillips 1971 R *
 Phillips et al. 1975 L *
 Platts and Megahan 1975 F *
 Reiser and Bjornn 1979 R *
 Ringler and Hall 1975 F *
 Rosenberg and Snow 1975 R *
 Ruth and Harris 1975 R *
 Saskatchewan Dept. of the Environ. 1981 R
 Schwan et al. 1985 R *
 Scrivener and Brownlee 1982 R *
 Silsbee and Larson 1983 F *
 Swanson and Lienkaemper No date R *
 Swanston 1969 F *
 Swindel et al. 1983 F
 Thomas 1985 F
 Toews and Brownlee 1981 R *
 U.S. Environmental Protection Agency 1973 R *
 USFWS 1982 R
 Wagener 1984 F
 Welch et al. 1977 F *
 Wilson 1960 R *
 Yee and Roelofs 1980 R *

j. Grazing

Cordone and Kelly 1961 R
May and Davis 1981 R
Platts 1981a F
Platts 1981b R

k. Log storage/transport

Can. Dept. Fish. and Int. Pac. Salmon Fish. Comm. 1966 F
Schuytema and Shankland 1976 F
Toews and Brownlee 1981 R *

l. Processing lumber/kraft/pulp

Bartsch 1960 R *
Hall 1969 R
Kramer and Smith 1965 *

m. Processing minerals (including gravel)

ADF&G 1983 R
Bartsch 1960 R *
Bjornn et al. 1977 F
Bowden et al. 1983 R
Brown (R.J.) and Baker 1975 R *
Campbell 1954 F
Caplice 1959 F
Gammon 1970 F
Hall and McKay 1983 R *
Harvey et al. 1982 F
Johnson 1984b R *
LaPerriere et al. 1983 F
Martin and Platts 1981 R
McLeay et al. 1983 F *
Phillips et al. 1975 L *
Shaw and Maga 1943 F
Singleton et al. 1981 F
Soroka and Mackenzie-Grieve 1983 F
Sumner and Smith 1940 F
Wagener 1984 F
Weber and Post 1985 F

n. Solid waste disposal

Moore and Sutherland 1981 F
Pedicord and McFarland 1978 L

o. Stream crossing - fords

Cordone and Kelly 1961 R

p. Stream crossing - structures

USFWS 1982 R

q. Transport of personnel/equipment/material - land,ice

Day and Carvell 1979 F

r. Water regulation/withdrawal/irrigation

Bartsch 1960 R *

Reiser 1981 F

Reiser and Ramey 1985 R

Trautman and Gartman 1974 F *

5. Removal of substrate materials:

a. Channelizing waterways

Benke et al. 1979 F *

Bottom et al. 1985 R *

Henegar and Harmon 1971 R

Rees 1959 F *

Reger and Helm 1982 F

Schoof 1980 R

Simpson et al. 1982 R *

Stern and Stern 1980a R

Stern and Stern 1980b R

Swales 1982 R

b. Clearing and tree harvest

Bjornn et al. 1977 F

Rice et al. 1972 R *

Ruth and Harris 1975 R *

Swanston 1969 F *

c. Dredging

Bjornn et al. 1977 F

Bowden et al. 1983 R

Brown (R.J.) and Baker 1975 R *

Campbell 1954 F

Caplice 1959 F

Harvey et al. 1982 F

McLeay et al. 1983 F *

Meehan and Swanston 1977 F

Peddicord and McFarland 1978 L

Rees 1959 F *

Wagener 1984 F

d. Grading/plowing

Aldrich and Johnson 1979 F *
 Bjornn et al. 1977 F
 Cordone and Kelly 1961 R
 Ruth and Harris 1975 R *
 Saskatchewan Dept. of the Environ. 1981 R
 Swanston 1969 F *
 Thomas 1985 F
 Wagener 1984 F

e. Processing minerals (including gravel)

Bjornn et al. 1977 F
 Bowden et al. 1983 R
 Brown (R.J.) and Baker 1975 R *
 Campbell 1954 F
 Caplice 1959 F
 Harvey et al. 1982 F
 Martin and Platts 1981 R
 Singleton et al. 1981 F
 Sumner and Smith 1940 F
 Wagener 1984 F

f. Water regulation/withdrawal/irrigation

Reiser and Ramey 1985 R

6. Physical disturbance of substrate materials:

a. Burning

Brown (G.W.) and Krygier 1971 F *
 Everest and Harr 1982 R *
 Lutz 1956 R
 Megahan and Molitor 1975 F
 Rice et al. 1972 R *
 Swanston 1971 R *
 Swindel et al. 1983 F

b. Channelizing waterways

Barton and Winger 1973 F
 Benke et al. 1979 F *
 Bottom et al. 1985 R *
 Bradt and Wieland 1978 F
 Cederholm 1972 F *
 Cederholm and Koski 1977 F *
 Chutter 1969 R *
 Cordone and Kelly 1961 R
 Emerson 1971 F *
 Etnier 1972 F *

Griswold et al. 1978 F
 Hansen and Muncy 1971 F
 Hasfurther 1985 R *
 Henegar and Harmon 1971 R
 Johnson et al. 1974 F
 Kelly 1975 F
 Little 1973a R
 Little 1973b R *
 Lund 1976 F *
 Marzolf 1978 R
 Nunnally 1978 R
 Parrish et al. 1978 R *
 Platts and Rinne 1985 R
 Rees 1959 F *
 Reger and Helm 1982 F
 Schoof 1980 R
 Shields 1982 R
 Shields and Palermo 1982 R
 Simpson et al. 1982 R *
 Stern and Stern 1980a R
 Stern and Stern 1980b R
 Striffler 1960 R
 Swales 1982 R
 Thackston and Sneed 1982 R
 U.S. Dept. of Transportation 1979 R
 USFWS 1980 R
 Wesche 1985 R *
 Whitaker et al. 1979 F *
 White 1973 R
 Winger 1972 F
 Wolf et al. 1972 F *
 Wydoski 1978 R
 Wydoski and Helm 1980 F

c. Clearing and tree harvest

Beschta 1978 F *
 Beschta 1979 F *
 Bethlahmy 1967 F
 Bjornn et al. 1977 F
 Bottom et al. 1985 R *
 Brown (G.W.) 1972 R *
 Brown (G.W.) and Krygier 1971 F *
 Burns 1970 F *
 Cederholm 1977 R *
 Chamberlin 1982 R *
 Chutter 1969 R *
 Cordone and Kelly 1961 R
 Crouse et al. 1981 F *
 Fredriksen 1970 F *
 Froehlich 1979 F

Gent et al. 1984 F
 Gibbons and Salo 1973 R *
 Graynoth 1979 F *
 Harris 1973 F *
 Harris 1977 F *
 Hartman et al. 1983 R *
 Koski and Walter 1977 R *
 Lantz 1971a R *
 Lull 1959 F *
 Meehan 1974 R *
 Megahan and Kidd 1972 F *
 Megahan and Molitor 1975 F
 Moring 1982 F *
 Murphy et al. 1981 F *
 Patric and Gorman 1978 F
 Ponce and Brown 1974 L *
 Rice et al. 1972 R *
 Ruth and Harris 1975 R *
 Silsbee and Larson 1983 F *
 Swanson and Dyrness 1975 F *
 Swanston 1969 F *
 Swanston 1970 F *
 Swanston 1971 R *
 Swindel et al. 1983 F
 U.S. Environmental Protection Agency 1975b R *
 U.S. Forest Service et al. 1976 F
 Welch et al. 1977 F *
 Wilson 1960 R *
 Wu and Swanston 1980 R *

d. Draining

Little 1973a R
 Little 1973b R *

e. Dredging

Bjornn et al. 1977 F
 Bowden et al. 1983 R
 Brown (R.J.) and Baker 1975 R *
 Campbell 1954 F
 Caplice 1959 F
 Cordone and Kelly 1961 R
 Gore and Johnson 1980 F
 Harvey et al. 1982 F
 Johnson 1984b R *
 Oregon St. Game Commission et al. 1955 F
 Peddicord and McFarland 1978 L
 Rees 1959 F *
 Shaw and Maga 1943 F
 Wagener 1984 F

Wilson 1960 R *

Woodward-Clyde Consultants 1980 F

f. Drilling

Peddicord and McFarland 1978 L

g. Filling (aquatic and wetland habitats):

Cordone and Kelly 1961 R

h. Grading/plowing

ADEC and R and M Consultants 1980 R *

Aldrich and Johnson 1979 F *

Barton 1977 F *

Beschta 1978 F *

Beschta 1979 F *

Bjornn et al. 1977 F

Bottom et al. 1985 R *

Brown (G.W.) 1972 R *

Brown (G.W.) and Krygier 1971 F *

Burns 1970 F *

Cederholm et al. 1981 F *

Chamberlin 1982 R *

Chutter 1969 R *

Cordone and Kelly 1961 R

Cowen 1974 R *

Crouse et al. 1981 F *

Elliott 1986 R *

Everest and Harr 1982 R *

Fredriksen 1970 F *

Gibbons and Salo 1973 R *

Harris 1973 F *

Hartman et al. 1983 R *

Kochenderfer 1970 R

Koski and Walter 1977 R *

Lantz 1971a R *

Lenat et al. 1981 F *

Lull 1959 F *

McCashion and Rice 1983 F *

Meehan 1974 R *

Megahan and Kidd 1972 F *

Oregon St. Game Commission et al. 1955 F

Rice et al. 1972 R *

Ruth and Harris 1975 R *

Saskatchewan Dept. of the Environ. 1981 R

Silsbee and Larson 1983 F *

Swanson and Dyrness 1975 F *

Swanston 1969 F *

Swanston 1970 F *

Swanston 1971 R *
 Swindel et al. 1983 F
 Thomas.1985 F
 U.S. Environmental Protection Agency 1973 R *
 U.S. Forest Service et al. 1976 F
 Wagener 1984 F
 Welch et al. 1977 F *
 Wilson 1960 R *
 Yee and Roelofs 1980 R *

i. Grazing

Cordone and Kelly 1961 R
 May and Davis 1981 R
 Platts 1981a F
 Platts 1981b R
 Platts and Rinne 1985 R

j. Log storage/transport

Can. Dept. Fish. and Int. Pac. Salmon Fish. Comm. 1966 F
 Toews and Brownlee 1981 R *

k. Processing minerals (including gravel)

Bjornn et al. 1977 F
 Bowden et al. 1983 R
 Brown (R.J.) and Baker 1975 R *
 Campbell 1954 F
 Caplice 1959 F
 Gore and Johnson 1980 F
 Harvey et al. 1982 F
 Johnson 1984b R *
 Martin and Platts 1981 R
 Shaw and Maga 1943 F
 Singleton et al. 1981 F
 Scroka and Mackenzie-Grieve 1983 F
 Sumner and Smith 1940 F
 Wagener 1984 F
 Weber and Post 1985 F
 Woodward-Clyde Consultants 1980 F

l. Solid waste disposal

Peddicord and McFarland 1978 L

m. Stream crossing - fords

Cordone and Kelly 1961 R

n. Transport of oil/gas/water - land,ice

Hok 1969 F

o. Transport of personnel/equipment/material - land,ice

Hok 1969 F

p. Water regulation/withdrawal/irrigation

Reiser 1981 F

7a. Alteration of natural cover--riparian vegetation:

a. Burning

Everest and Harr 1982 R *

Lutz 1956 R

Tiedemann et al. 1979 R

Viereck 1983 F

Viereck and Schandelmeir 1980 R

b. Channelizing waterways

Babcock 1982 F

Barton and Winger 1973 F

Beland 1953 F *

Bottom et al. 1985 R *

Boussu 1954 F *

Bradt and Wieland 1978 F

Bulkley et al. 1976 R

Chapman and Knudsen 1980 F *

Cowan and Oswood 1983 F

Elser 1968 F *

Hansen and Muncy 1971 F

Hasfurther 1985 R *

Hathaway 1978 F *

Henegar and Harmon 1971 R

Karr and Schlosser 1977 R *

King and Carlander 1976 F *

Little 1973a R

Little 1973b R *

Lund 1976 F *

McCrimmon and Kwain 1966 F *

Nunnally 1978 R

Platts and Rinne 1985 R

Saunders and Smith 1962 F

Schlosser 1982 F

Schoof 1980 R

Sheeter and Claire 1981 F

Shields 1982 R

Shields and Palermo 1982 R

Simpson et al. 1982 R *
 Smith 1976 F
 Striffler 1960 R
 Swales and O'Hara 1980 R
 Tarplee et al. 1971 F *
 Timbol and Maciolek 1978 F *
 U.S. Dept. of Transportation 1979 R
 USFWS 1980 R
 Wesche 1985 R *
 Wesche et al. 1985 F
 White 1973 R
 White and Brynildson 1967 R
 Whitney and Bailey 1959 F *
 Wiley and Dufek 1976 F *
 Winger 1972 F
 Woods 1977 F
 Wydoski and Helm 1980 F
 Zimmerman et al. 1967 F

c. Chemical application

Norris et al. 1983 R

d. Clearing and tree harvest

Aldrich and Johnson 1979 F *
 Barrick 1984 F *
 Barton et al. 1985 F *
 Bisson and Sedell 1984 F
 Bottom et al. 1985 R *
 Brown (G.W.) 1972 R *
 Brown (G.W.) and Krygier 1970 F *
 Bryant 1980 F *
 Bryant 1983 R *
 Burns 1972 F *
 Bustard and Narver 1975b F
 Chamberlin 1982 R *
 Corbett et al. 1978 R *
 Cowan and Oswood 1983 F
 Culp and Davies 1983 F *
 Elliott 1986 R *
 Erman and Mahoney 1983 F *
 Erman et al. 1977 F *
 Gibbons and Salo 1973 R *
 Graynoth 1979 F *
 Hartman et al. 1983 R *
 Holtby and Hartman 1982 F *
 Karr and Schlosser 1977 R *
 Kochenderfer 1970 R
 Koski and Walter 1977 R *
 Koski et al. 1984 F *

Lantz 1971a R *
 Lantz 1971b R
 Lotspeich and Helmers 1974 R
 Martin and Pierce 1980 F
 Meehan et al. 1985 R
 Moring 1982 F *
 Murphy and Hall 1981 F *
 Murphy et al. 1981 F *
 Narver 1971 R *
 Narver 1972 F *
 Oregon Wildlife Commission 1974 *
 Osborn 1980 F
 Reed and Elliott 1972 F *
 Reiser and Bjornn 1979 R *
 Ringler and Hall 1975 F *
 Rishel et al. 1982 F *
 Ruth and Harris 1975 R *
 Schwan et al. 1985 R *
 Smith 1976 F
 Swanson and Lienkaemper No date R *
 Toews and Brownlee 1981 R *
 Toews and Moore 1982 F *
 Tschaplinski and Hartman 1983 F *
 U.S. Forest Service et al. 1976 F
 USACRREL 1980 F *
 Welch et al. 1977 F *

e. Draining

Little 1973a R
 Little 1973b R *
 Lotspeich and Helmers 1974 R
 USACRREL 1980 F *

f. Dredging

Woodward-Clyde Consultants 1980 F

g. Filling (aquatic and wetland habitats):

Barrick 1984 F *

h. Grading/plowing

Barrick 1984 F *
 Brown (G.W.) 1972 R *
 Bryant 1980 F *
 Bryant 1983 R *
 Burns 1972 F *
 Bustard and Narver 1975b F
 Chamberlin 1982 R *

Cowan and Oswood 1983 F
 Cowen 1974 R *
 Culp and Davies 1983 F *
 Erman and Mahoney 1983 F *
 Erman et al. 1977 F *
 Everest and Harr 1982 R *
 Gibbons and Salo 1973 R *
 Hartman et al. 1983 R *
 Karr and Schlosser 1977 R *
 Koski and Walter 1977 R *
 Koski et al. 1984 F *
 Lantz 1971a R *
 Lotspeich 1971 R *
 Lotspeich and Helmers 1974 R
 Narver 1972 F *
 Oregon Wildlife Commission 1974 *
 Reed and Elliott 1972 F *
 Reiser and Bjornn 1979 R *
 Ringler and Hall 1975 F *
 Ruth and Harris 1975 R *
 Schwan et al. 1985 R *
 Smith 1976 F
 Swanson and Lienkaemper No date R *
 U.S. Forest Service et al. 1976 F
 USACRREL 1980 F *
 USFWS 1982 R
 Whitney and Bailey 1959 F *

i. Grazing

Chapman and Knudsen 1980 F *
 Cowan and Oswood 1983 F
 Platts 1981a F
 Platts 1981b R
 Platts and Rinne 1985 R

j. Processing minerals (including gravel)

Brown (R.J.) and Baker 1975 R *
 Cowan and Oswood 1983 F
 Karr and Schlosser 1977 R *
 Lotspeich and Helmers 1974 R
 Martin and Platts 1981 R
 Weber and Post 1985 F
 Woodward-Clyde Consultants 1980 F

k. Stream crossing - structures

Lotspeich 1971 R *
 Lotspeich and Helmers 1974 R
 USACRREL 1980 F *

USFWS 1982 R

1. Transport of personnel/equipment/material - land,ice

Day and Carvell 1979 F

7b. Alteration of natural cover--aquatic vegetation (including algae):

a. Channelizing waterways

Babcock 1982 F
Benke et al. 1979 F *
Bottom et al. 1985 R *
Boussu 1954 F *
Bulkley et al. 1976 R
Hansen and Muncy 1971 F
Hendrick 1976 F
Henegar and Harmon 1971 R
Keller and Swanson 1979 F
Marzolf 1978 R
McCrimmon and Kwain 1966 F *
Saunders and Smith 1962 F
Shields and Palermo 1982 R
Swales 1982 R
Swales and O'Hara 1980 R
Tarplee et al. 1971 F *
Wesche et al. 1985 F
White 1973 R
White and Brynildson 1967 R
Wiley and Dufek 1976 F *

b. Clearing and tree harvest

Barton et al. 1985 F *
Bisson and Sedell 1984 F
Bottom et al. 1985 R *
Bryant 1980 F *
Bryant 1983 R *
Cederholm 1977 R *
Culp and Davies 1983 F *
Hansmann and Phinney 1973 F *
Hartman and Holtby 1982 R
Holtby and Hartman 1982 F *
Keller and Swanson 1979 F
Lestelle and Cederholm 1984 F *
Meehan 1974 R *
Meehan et al. 1985 R
Osborn 1980 F
Reed and Elliott 1972 F *
Reiser and Bjornn 1979 R *

Schwan et al. 1985 R *

Sheridan and McNeil 1968 F

Silsbee and Larson 1983 F *

Swanson and Dyrness 1975 F *

Swanson and Lienkaemper No date R *

Toews and Moore 1982 F *

Tschaplinski and Hartman 1983 F *

c. Filling (aquatic and wetland habitats):

Moulton et al. 1985 F *

d. Grading/plowing

Bottom et al. 1985 R *

Bryant 1980 F *

Bryant 1983 R *

Culp and Davies 1983 F *

Hartman and Holtby 1982 R

Keller and Swanson 1979 F

Meehan 1974 R *

Reed and Elliott 1972 F *

Reiser and Bjornn 1979 R *

Schwan et al. 1985 R *

Swanson and Dyrness 1975 F *

Swanson and Lienkaemper No date R *

e. Transport of oil/gas/water - land,ice

Hok 1969 F

f. Transport of personnel/equipment/material - land,ice

Hok 1969 F

7c. Alteration of natural cover--overhanging bank or shoreline:

a. Channelizing waterways

Babcock 1982 F

Bianchi and Marcoux 1976 F

Bottom et al. 1985 R *

Boussu 1954 F *

Bradt and Wieland 1978 F

Bulkley 1976 F *

Bulkley et al. 1976 R

Chapman and Knudsen 1980 F *

Cooper and Wesche 1976 R

Hasfurther 1985 R *

Henegar and Harmon 1971 R

Keller and Swanson 1979 F
 King and Carlander 1976 F *
 McCrimmon and Kwain 1966 F *
 Mecum 1984 F *
 Menzel and Fierstine 1976 F
 Saunders and Smith 1962 F
 Shields and Palermo 1982 R
 Simpson et al. 1982 R *
 Swales and O'Hara 1980 R
 Tarplee et al. 1971 F *
 U.S. Dept. of Transportation 1979 R
 USFWS 1980 R
 Wesche 1985 R *
 Wesche et al. 1985 F
 White 1973 R
 White and Brynildson 1967 R
 Wiley and Dufek 1976 F *
 Zimmer and Bachmann 1976 F
 Zimmer and Bachmann 1978 F *
 Zimmerman et al. 1967 F

b. Clearing and tree harvest

Barrick 1984 F *
 Bisson and Sedell 1984 F
 Bryant 1980 F *
 Bustard and Narver 1975a F
 Chamberlin 1982 R *
 Elliott 1986 R *
 Hartman et al. 1983 R *
 Keller and Swanson 1979 F
 Lotspeich and Helmers 1974 R
 Narver 1971 R *
 Narver 1972 F *
 Osborn 1980 F
 Reed and Elliott 1972 F *
 Reiser and Bjornn 1979 R *
 Schwan et al. 1985 R *
 U.S. Forest Service et al. 1976 F
 Welch et al. 1977 F *

c. Draining

Lotspeich and Helmers 1974 R

d. Dredging

Woodward-Clyde Consultants 1980 F

e. Filling (aquatic and wetland habitats):

Barrick 1984 F *

f. Grading/plowing

Barrick 1984 F *
Bryant 1980 F *
Bustard and Narver 1975a F
Chamberlin 1982 R *
Cooper and Wesche 1976 R
Hartman et al. 1983 R *
Keller and Swanson 1979 F
Lotspeich 1971 R *
Lotspeich and Helmers 1974 R
Narver 1972 F *
Reed and Elliott 1972 F *
Reiser and Bjornn 1979 R *
Schwan et al. 1985 R *

g. Grazing

Cooper and Wesche 1976 R
May and Davis 1981 R
Platts 1981b R

h. Human disturbance

Barrick 1984 F *

i. Processing minerals (including gravel)

Cooper and Wesche 1976 R
Lotspeich and Helmers 1974 R
Singleton et al. 1981 F
Woodward-Clyde Consultants 1980 F

j. Stream crossing - structures

Lotspeich 1971 R *
Lotspeich and Helmers 1974 R

8a. Addition of physical barriers--impoundments (e.g., hydroelectric dams, settling ponds):

a. Channelizing waterways

Swales and O'Hara 1980 R

b. Dredging

h. Stream crossing - structures

Lotspeich 1971 R *

i. Water regulation/withdrawal/irrigation

Bodaly et al. 1984a F *

Bodaly et al. 1984b F

8c. Addition of physical barriers--partial obstructions:

a. Channelizing waterways

Elliott 1982 F

Hansen 1971 F *

Timbol and Maciolek 1978 F *

b. Clearing and tree harvest

Barrick 1984 F *

Chamberlin 1982 R *

Gibbons and Salo 1973 R *

Lotspeich and Helmers 1974 R

Narver 1971 R *

Ruth and Harris 1975 R *

Schwan et al. 1985 R *

Swanson and Lienkaemper No date R *

Toews and Moore 1982 F *

c. Draining

Lotspeich and Helmers 1974 R

d. Grading/plowing

Barrick 1984 F *

Bell 1986 R

Cederholm 1977 R *

Chamberlin 1982 R *

Cowen 1974 R *

Lotspeich 1971 R *

Lotspeich and Helmers 1974 R

Ruth and Harris 1975 R *

Saskatchewan Dept. of the Environ. 1981 R

Schwan et al. 1985 R *

Swanson and Lienkaemper No date R *

Toews and Brownlee 1981 R *

Yee and Roelofs 1980 R *

e. Processing minerals (including gravel)

Woodward-Clyde Consultants 1980 F

c. Processing minerals (including gravel)

Woodward-Clyde Consultants 1980 F

d. Water regulation/withdrawal/irrigation

Hall 1979 F

8b. Addition of physical barriers--diversions (e.g., channels, canals):

a. Channelizing waterways

Cooper and Wesche 1976 R
Elliott 1980 F *
Hathaway 1978 F *
Henegar and Harmon 1971 R

b. Clearing and tree harvest

Dryden and Stein 1975 R *

c. Draining

Lotspeich and Helmers 1974 R

d. Dredging

Woodward-Clyde Consultants 1980 F

e. Grading/plowing

Bradt and Wieland 1978 F
Cooper and Wesche 1976 R
Dryden and Stein 1975 R *
Lotspeich 1971 R *
Lotspeich and Helmers 1974 R

f. Grazing

Cooper and Wesche 1976 R

g. Processing minerals (including gravel)

Cooper and Wesche 1976 R
Lotspeich and Helmers 1974 R
Woodward-Clyde Consultants 1980 F

Lotspeich and Helmers 1974 R

f. Stream crossing - fords

Reed and Elliott 1972 F *

g. Stream crossing - structures

Anderson and Bryant 1980 R

Bell 1986 R

Bryant 1981 F

Dane 1978a R

Dane 1978b R

Dryden and Stein 1975 R *

Elliott 1982 F

Gibbons and Salo 1973 R *

Lotspeich 1971 R *

Lotspeich and Helmers 1974 R

MacPhee and Watts 1975 F

Oregon Wildlife Commission 1974 *

Reed and Elliott 1972 F *

Rosenberg and Snow 1975 R *

Saskatchewan Dept. of the Environ. 1981 R

Timbol and Maciolek 1978 F *

U.S. Forest Service et al. 1976 F

Watts 1974 R

8d. Addition of physical barriers--other:

a. Sewage disposal

Tsai 1970 F

9. Increase in hydrostatic pressure or noise:

a. Blasting

Falk and Lawrence 1973 F

Jensen and Alderdice 1983 L

b. Human disturbance

Barrick 1984 F *

c. Water regulation/withdrawal/irrigation

Bell 1986 R

10. Impingement or entrainment or entanglement:

a. Dredging

Griffith and Andrews 1981 F

b. Processing geothermal energy

Suter 1978

c. Processing minerals (including gravel)

Griffith and Andrews 1981 F

d. Water regulation/withdrawal/irrigation

Bell 1986 R

Fritz 1980 R

Hall 1979 F

Nelson and Beckman 1980 F

11. Physical trampling or crushing:

a. Clearing and tree harvest

Lull 1959 F *

b. Grazing

Platts 1981b R

Striffler 1960 R

c. Human disturbance

Striffler 1960 R

12. Change in level of dissolved oxygen, nitrogen:

a. Channelizing waterways

Anderson and Broekstra 1977 F

Bradt and Wieland 1978 F

Darnell et al. 1976 R

Hall and McKay 1983 R *

Hathaway 1978 F *

Huish and Pardue 1978 F

O'Rear 1975 F *

Parrish et al. 1978 R *

Phillips 1971 R *

Stern and Stern 1980a R
Stern and Stern 1980b R

b. Clearing and tree harvest

Barrick 1984 F *
Brannon 1965 L
Brown (G.W.) 1972 R *
Chamberlin 1982 R *
Gibbons and Salo 1973 R *
Graynoth 1979 F *
Hall and Lantz 1969 F *
Hall and McKay 1983 R *
Koski and Walter 1977 R *
Meehan 1974 R *
Murphy 1985 F
Narver 1971 R *
Oregon Wildlife Commission 1974 *
Phillips 1971 R *
Ponce and Brown 1974 L *
R and M Consultants 1977 R *
Reiser and Bjornn 1979 R *
Ringler and Hall 1975 F *
Scrivener and Brownlee 1982 R *
Shumway et al. 1964 F *
Wilson 1960 R *

c. Dredging

ADF&G 1983 R
Bartsch 1960 R *
Bowden et al. 1983 R
Darnell et al. 1976 R
Hall and McKay 1983 R *
Phillips 1971 R *
Shumway et al. 1964 F *
Wilson 1960 R *
Woodward-Clyde Consultants 1980 F

d. Grading/plowing

Bartsch 1960 R *
Brannon 1965 L
Chamberlin 1982 R *
Gibbons and Salo 1973 R *
Hall and McKay 1983 R *
Koski and Walter 1977 R *
Meehan 1974 R *
Oregon Wildlife Commission 1974 *
Phillips 1971 R *
Reiser and Bjornn 1979 R *

Bradt and Wieland 1978 F
 Darnell et al. 1976 R
 Hathaway 1978 F *
 Norton et al. 1978 F *
 Parrish et al. 1978 R *
 Schmal and Sanders 1978 F *

b. Clearing and tree harvest

Schwan et al. 1985 R *
 Silsbee and Larson 1983 F *

c. Dredging

Darnell et al. 1976 R
 LaPerriere et al. 1983 F

d. Grading/plowing

Huckabee et al. 1975 F *
 LaPerriere et al. 1983 F
 Schwan et al. 1985 R *

e. Processing lumber/kraft/pulp

Hall 1969 R

f. Processing minerals (including gravel)

Caplice 1959 F
 Clarke 1974 R
 Daye 1980 R
 Johnston et al. 1984 L
 LaPerriere et al. 1983 F
 Lett et al. 1976 L
 Martin and Platts 1981 R

g. Sewage disposal

Tsai 1970 F

h. Water regulation/withdrawal/irrigation

Geen and Andrew 1961 F
 Hesse and Newcomb 1982 F

14. Change in levels of heavy metals:

a. Channelizing waterways

Ringler and Hall 1975 F *
Rosenberg and Snow 1975 R *
Scrivener and Brownlee 1982 R *
Shumway et al. 1964 F *
Wilson 1960 R *

e. Human disturbance

Aukerman and Springer 1976 F

f. Log storage/transport

Oregon Wildlife Commission 1974 *
Schuytema and Shankland 1976 F

g. Processing minerals (including gravel)

ADF&G 1983 R
Bowden et al. 1983 R
Brannon 1965 L
Caplice 1959 F
Hall and McKay 1983 R *
Woodward-Clyde Consultants 1980 F

h. Sewage disposal

Shumway et al. 1964 F *
Tsai 1970 F
Tsai 1975 R

i. Transport of personnel/equipment/material - land,ice

R and M Consultants 1977 R *

j. Water regulation/withdrawal/irrigation

Bell 1986 R
Brannon 1965 L
Ciliberti 1980 F
Decker-Hess and McMullin 1983 F
Ebel et al. 1975 F
Hesse and Newcomb 1982 F
Meekin and Allen 1974 F
Meekin and Turner 1974 L
Reiser and Ramey 1985 R

13. Change in levels of pH, alkalinity, or hardness:

a. Channelizing waterways

O'Rear 1975 F *

b. Chemical application

Bell 1986 R

c. Dredging

Bell 1986 R
Brown (E.J.) et al. 1982 F
LaPerriere et al. 1983 F
Martin 1983 F
Peddicord and McFarland 1978 L
Seelye et al. 1982 L *
Wagener 1984 F

d. Drilling

Peddicord and McFarland 1978 L

e. Grading/plowing

LaPerriere et al. 1983 F
Martin 1983 F
Wagener 1984 F

f. Processing minerals (including gravel)

Beamish et al. 1975 F
Bell 1986 R
Brown (E.J.) et al. 1982 F
Brown (V.M.) et al. 1969 L *
Chapman 1978 L
Clarke 1974 R
Finlayson and Ashuckian 1979 L
Harrison 1975 L
Hartman 1978 L
LaPerriere et al. 1983 F
Lett et al. 1976 L
Martin 1983 F
Martin and Platts 1981 R
Ray and Coffin 1977 R
Soroka and Mackenzie-Grieve 1983 F
Wagener 1984 F

g. Processing oil/gas

Brown (V.M.) et al. 1969 L *
Cote 1976 R

h. Sewage disposal

Duba 1981 F
Fraser and Clark 1984 L
Hartman 1978 L
Hartmann 1983 F
Ray and Coffin 1977 R

i. Solid waste disposal

Chapman 1978 L
Finlayson and Ashuckian 1979 L
Hartman 1978 L
Martin 1983 F
Moore and Sutherland 1981 F
Peddicord and McFarland 1978 L
Seelye et al. 1982 L *

j. Transport of personnel/equipment/material - land,ice

Martin 1983 F
VanHassel 1979 F
Wilber 1978 F

k. Water regulation/withdrawal/irrigation

Bodaly et al. 1984a F *

15. Change in levels of chlorinated compounds other than biocides:

a. Dredging

Peddicord and McFarland 1978 L

b. Drilling

Peddicord and McFarland 1978 L

c. Processing lumber/kraft/pulp

Hall 1969 R

d. Processing minerals (including gravel)

Clarke 1974 R

e. Sewage disposal

Brooks and Seegert 1975 R
Clarke et al. 1977 L
Gehrs and Southworth 1975 L
Kopperman et al. 1975 R

Tsai 1970 F
Tsai 1973 F
Tsai 1975 R

f. Solid waste disposal

Peddicord and McFarland 1978 L

16. Introduction of biocides:

a. Channelizing waterways

Darnell et al. 1976 R

b. Chemical application

Bell 1986 R
Cederholm 1977 R *
Everest and Harr 1982 R *
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c. Clearing and tree harvest

Koski and Walter 1977 R *
Rishel et al. 1982 F *

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Darnell et al. 1976 R

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Koski and Walter 1977 R *
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17a. Change in levels of other toxic compounds--bark or log leachates:

a. Clearing and tree harvest

Peters et al. 1976 L *
Schwan et al. 1985 R *

b. Grading/plowing

Schwan et al. 1985 R *

c. Log storage/transport

Can. Dept. Fish. and Int. Pac. Salmon Fish. Comm. 1966 F
Cederholm 1977 R *
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d. Processing lumber/kraft/pulp

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17b. Change in levels of other toxic compounds--sulfurous compounds:

a. Chemical application

Blahm 1978 L

b. Grading/plowing

Huckabee et al. 1975 F *

c. Processing geothermal energy

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e. Processing oil/gas

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f. Sewage disposal

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Rosenberg and Wiens 1976 F

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Mitrovic et al. 1968 L *

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Mitrovic et al. 1968 L *

Swift 1978 L *

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Mitrovic et al. 1968 L *

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g. Grading/plowing

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Kuenzler et al. 1977 F *
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Rosenberg and Wiens 1976 F

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Rosenberg and Wiens 1976 F

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Hall 1979 F

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E. Correction Form

This appendix includes a detachable form that may be used to correct errors in the existing document. Please help us locate the errors in order that we can improve the updated version of this document. Send corrections to the following address:

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 National Research Council Canada 1983
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Penrose 1982
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21. Sewage disposal:

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Botton 1979

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 Gordon and McLeay 1977
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 Oladimeji and Wade 1984
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 Roberts and Willis 1981
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 Rombough 1982
 Saunders et al. 1983
 Scherer et al. 1975
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22. Solid waste disposal:

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Johnson et al. 1978a
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Pedersen 1983
Russo et al. 1981
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Smith and Snyder 1976
Stone et al. 1981
Thronson 1979
U.S. EPA and Jones & Stokes Associates, Inc. 1983
Westley et al. 1975

23. Stream crossing - fords:

Gibbons 1980

24. Stream crossing - structures:

Arctic Hydrologic Consultants 1985
Ashton and Carlson 1984
Derksen 1980
Gebhards and Fisher 1972
Jones et al. 1974
Katopodis et al. 1978
Kratt 1981
Metsker 1970
Pavlov et al. 1982
Taylor and McPhail 1985
Tsui and McCart 1981
Watts et al. 1972
Welch 1979

25. Transport of oil/gas/water - land:

Bliss 1983
Bliss and Wein 1972

26. Transport of oil/gas/water - water:

Ahsanullah et al. 1982
Alexander and Webb 1985
American Petroleum Institute et al. 1981
American Petroleum Institute et al. 1983
Anderson 1977a
Anderson 1977b
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Armstrong et al. 1981
Atlas and Bronner 1981
Baker 1978
Bayliss and Spoltman 1981
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Berdugo et al. 1977
Bieri and Stamoudis 1977
Blackman and Law 1980
Blumer 1970
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Farke et al. 1985
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Friha and Conan 1981
Fucik and Neff 1977
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 Gooday 1980
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 Gundlach and Hayes 1978
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 Hyland et al. 1976
 Jernelev et al. 1976
 Johansson 1980
 Johnson 1977
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 Karydis and Fogg 1980
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 Korn and Rice 1985
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 Laughlin and Neff 1977
 Law 1978
 Lee 1977
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 Luquet et al. 1983
 Mackie et al. 1978
 Malins 1977
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 McAuliffe 1977a
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 McCain 1978
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 Meyne and Deaven 1982

Michael 1977
 Miller et al. 1978
 Moldan et al. 1979
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 National Research Council Canada 1983
 Nellbring et al. 1980
 Nicholson and Cimberg 1971
 Notini 1978
 Notinl 1980
 O'Brien 1978
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 Otto 1973
 Owens et al. 1983
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 Patten 1977
 Payne et al. 1978
 Penrose 1982
 Percy 1977
 Percy 1982
 Pfaender and Buckley 1984
 Phillips 1984
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 Ray 1981
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 Soule and Oguri 1978
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Varanasi and Malins 1977
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Wells 1982
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Wolfe 1978a
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Woodward and Riley 1983
Zitko et al. 1984

27. Transport personnel/equipment/material - air:

No additional references.

28. Transport personnel/equipment/material - land:

Adams 1975a
Bliss 1983
Field 1978
Haan and Devore 1975
Judy 1985
Lorenz 1978
Ney and Van Hassel 1983
Nix et al. 1978
Perkins et al. 1980
Pitt 1978
Pitt and Bozeman 1982
Sutherland and Ogle 1975
U.S. Army Corps of Engineers 1979
VanHassel et al. 1980
Weller et al. 1983

29. Transport personnel/equipment/material - water:

No additional references.

30. Water regulation/withdrawal/irrigation:

Barker and Stewart 1978
Battelle Memorial Institute 1984

Bauersfeld 1977
Bauersfeld 1978a
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Becker et al. 1982
Becker et al. 1983
Benda and Houtcooper 1976
Boreman 1977
Bouck and King 1983
Bowles and Merriner 1978
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Brusven and Trihey 1978
Cannon et al. 1978
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Curtis 1959
Cushman 1985
Davies and Jensen 1974a
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Ebel 1982
Ebel et al. 1979
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Fickeisen and Schneider 1976
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Gasaway 1970
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Hanson et al. 1977
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Haven and Ginn 1978
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Hickey 1982
Holcik and Bastl 1976
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Hoss et al. 1975
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Iwamoto et al. 1978
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Johnson 1980
Jordan et al. 1983
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Kastendiek et al. 1981
Kelso and Leslie 1979
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King 1978
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Langford 1972
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Larson 1982
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Leslie et al. 1979
Lieberman and Muessig 1978
Lifton and Storr 1978
March 1976
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Northwest Power Planning Council 1985
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Rucker (no date)
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Skinner 1974
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Stober et al. 1982
Stroud et al. (no date)
Taft and Isakson 1983
Tatham et al. 1978
Townsend 1975
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Urban Wildlife Research Center, Inc. 1980
Uziel 1980
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Victor-Baptiste and Wohrer-Blanpied 1983
Walburg et al. 1981
Ward 1976
Ward and Stanford 1979
Ward and Stanford 1980
Woodin 1984

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1. Change in water temperature:

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Barker and Stewart 1978
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2. Change in depth or velocity of water:

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4. Addition of substrate materials:

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7. Alteration of natural cover:

No additional references.

8. Addition of physical barriers:

No additional references.

9. Increase in hydrostatic pressure or noise:

ADF&G 1973
 Anonymous 1966
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 Aplin 1946
 Baxter 1970
 Baxter 1985
 Bird and Roberson 1984
 Boardman et al. (no date)
 Bouck and King 1983
 Branscomb and Rittschof 1984
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 Department of Fisheries and Oceans (no date)
 Ebel 1982
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10. Impingement or entrainment or entanglement:

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11. Physical trampling or crushing:

Behnke and Raleigh 1978
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12. Change in level of dissolved oxygen:

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Ogunrombi and Dobbins 1970
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Sousa and Meade 1977
Stoltenberg and Sobel 1965
Stroud et al. (no date)
Wildish et al. 1977
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13. Change in levels of pH, alkalinity, or hardness:

Bates 1983
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Beyer et al. 1975
Birtwell 1978
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Hakanson 1980
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14. Change in level of salinity:

Alabaster et al. 1979
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15. Change in levels of heavy metals:

Armitage 1980
Battelle Pacific Northwest Laboratories (no date)
Birge 1978
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Bolger 1981
Braginskiy and Shcherban 1978
Brown 1981b
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Davis and Shand 1978
Derby and Atema 1981
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Furst 1983
Gettleston and Laird 1980
Gilbert et al. 1976
Gruger et al. 1978
Harrison and Rice (no date)
Havas and Hutchinson 1982
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McIntosh and Bishop 1976
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16. Change in levels of chlorinated compounds other than biocides:

Birtwell et al. 1983
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17. Change in levels of biocides (e.g., herbicides, insecticides, etc.):

Birtwell et al. 1983
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Sato et al. 1980
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18. Change in levels of other toxic compounds:

No additional references.

19. Change in levels of hydrocarbons (other than biocides) or dispersants:

Adams 1975a
Alexander et al. 1978
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Armstrong et al. 1981
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 Miller et al. 1978
 Moldan et al. 1979
 Mori et al. 1983

Motohiro and Iseya 1976
Mozley and Butler 1978
Nellbring et al. 1980
Nicholson and Cimberg 1971
Notini 1978
Notini 1980
O'Brien 1978
O'Sullivan 1978
Otto 1973
Patten 1977
Payne et al. 1978
Penrose 1982
Percy 1982
Pfaender and Buckley 1984
Power 1983a
Power 1983b
Power 1983c
Ray 1981
Reiter 1981
Richardson 1984
Roesijadi et al. 1978
Sanborn 1977
Sanders 1978
Sherman and Pearce 1978
Smith and Snyder 1976
Snow 1982
Southward and Southward 1978
Spooner 1977
Sprague and Carson 1970
Stainken 1977
Stainken 1978
Staveland 1979
Stegeman 1978
Steinhart et al. 1972
Straughan 1971b
Tatem 1977
Teal 1977
Thomas 1977
Thomas 1978
Vandermeulen 1980
Vandermeulen 1981
Vandermeulen 1982
Varanasi and Malins 1977
Vestal et al. 1984
Wells 1982
Whipple et al. 1978
Whipple et al. 1981
Whittle et al. 1978
Wicksten 1978
Woodward and Riley 1983
Zitko et al. 1984

20. Change in levels of nutrients (phosphoric or nitrogenous compounds):

Bradbury et al. 1975
Chang 1979
Clark et al. 1985
Debano and Conrad 1978
Dickman and Dorais 1977
Edwards 1981
Jones and Lee 1981
Kauffman and Krueger 1984
Kelsall et al. 1977
Lewis 1974
Meehan and Platts 1978
Platts 1978
Russo et al. 1981
Schillinger and Stuart 1978
Schindler et al. 1980
Shelton and Lessman 1977
Stockner and Costella 1978
Stockner et al. 1975
Wright 1976
Wright et al. 1976

21. Introduction or removal of species:

No additional references.

22. Artificial attractant to biological organisms (e.g., organic waste):

Beyer et al. 1975
Fitch and Young 1948

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