45 One Northwest Community—People, Salmon, Rivers, and the Sea: Toward Sustainable Salmon Fisheries

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Abstract.—Pacific salmon management is in crisis. Throughout their range, salmon and steelhead populations are being adversely affected by human activities. Without coordinated, effective, and timely action, the future of the Pacific salmon resource is most certainly in doubt. To address the challenges that are currently facing salmon management, concerned citizens representing a diverse array of government agencies and non-governmental organizations have agreed to cooperate in the development of a Sustainable Fisheries Strategy for west coast salmon and steelhead populations. The Strategy builds on the contents of this book, resulting from the Sustainable Fisheries Conference and subsequent community- and watershed-based citizen forums. This chapter presents the key elements of the Strategy including a common vision for the future, a series of guiding principles, and specific strategies for supporting sustainable fisheries. As such, the Strategy embraces an ecosystem-based approach to managing human activities, rather than the traditional egocentric approach to managing salmonid populations and associated habitats. A system of community-based, watershed-oriented councils, including all stakeholders and agency representatives, is proposed for effective transition to ecosystem-based salmon and steelhead management. It is our hope that everyone involved in Pacific salmon management will embrace both the spirit and the specific elements of the Sustainable Fisheries Strategy as we face the difficult challenges ahead.

INTRODUCTION

Humans have maintained a bond with Pacific salmon for thousands of years. Since the earliest residents of the Northwest crossed the Siberian land bridge, salmon have been an integral element of the economy, society, and culture that has developed on the west coast of North America. While significant social and economic changes have occurred since western people arrived some 200 years ago, the importance of salmon to the region remains essentially undiminished. In many ways, salmon continue to define the Pacific Northwest and its people, both in terms of our culture and societal values. One has difficulty considering the plight of the salmon without experiencing a personal sense of loss; our fate seems inextricably linked to theirs. The extinction of even one stock of salmon or steelhead diminishes our stature as humans and stewards of the resource.

ARTICULATING OUR COMMON VISION

People throughout the Northwest share a common desire to see salmon and steelhead populations returned to health. This overwhelming concern over the fate of the salmon has given rise to a

plethora of salmon protection, enhancement, and restoration plans and initiatives. However, in spite of our best efforts, we have not succeeded and are unlikely to restore salmon until these disparate efforts are effectively integrated into an ecosystem-based framework that encompasses the entire North American coast from California to Alaska. For this reason, concerned citizens representing a diverse array of government agencies and non-governmental organizations from throughout the Pacific Northwest have agreed to cooperate in the development of a Sustainable Fisheries Strategy for west coast salmon and steelhead populations (see Table 45.1).

The Sustainable Fisheries Strategy presented below was largely derived from the results of the "Toward Sustainable Fisheries" conference held in Victoria, British Columbia April 26–30, 1996 and attended by more than 500 delegates. The preceding chapters in this book, the results of several Forums on Sustainable Fisheries, as well as abundant other writings (particularly NRC 1996 and Stouder et al. 1997), provided additional background information for refining the Sustainable Fisheries Strategy described in this chapter. A full description of the Sustainable Fisheries Strategy is provided in SFF (1996) and on the Sustainable Fisheries Foundation home page (http://www.island.net/~sff-mesl).

Conference delegates shared technical information and engaged in facilitated discussions on five key issues related to fisheries sustainability, including:

- Developing harvest management strategies for sustainable fisheries;
- Protecting and restoring freshwater, estuarine, and marine habitats;
- Integrating communities into sustainable fisheries management;
- Increasing the production of salmon and steelhead; and
- Developing institutional and regulatory structures that favor sustainable fisheries.

To support the development of the Sustainable Fisheries Strategy, conference delegates were asked to establish a long-term vision for the future, determine which factors are constraining our ability to achieve this vision, and identify the actions that are needed to overcome these constraints. As a result, a shared vision of sustainable fisheries and a series of principles were developed that would support this vision. While the precise wording of the vision varied, it was generally agreed that:

> Our long-term vision for the Pacific Northwest includes healthy, diverse, and productive ecosystems, viable aboriginal, sport, and commercial salmon and steelhead fisheries, and vital and stable communities throughout the historical range of Pacific salmonids.

This vision clearly articulates a desired future condition that recognizes the inherent linkages between Pacific salmon, our continuing use of these resources, and the health of the environment and communities in which we live. It also encompasses a range of social, cultural, economic, and ecological values, thereby reflecting the interests and needs of virtually every resident of the region. The vision also reflects an ecosystem-based approach which views salmon and people as inextricably linked and recognizes that decisions affecting the well-being of the salmon will also influence our economy, culture, and communities—both now and in the future (Knudsen et al. 2000). The following guiding principles can be used to focus environmental management and salmon restoration programs in the future.

- People have the right to use Pacific fisheries resources for social, cultural, and economic purposes. With this right goes the responsibility to maintain and restore the abundance and diversity of salmon and steelhead populations throughout their range.
- Ecosystem integrity and the economic well-being of communities throughout the Northwest are interdependent; therefore, achieving and protecting ecosystem integrity is an essential part of economic and social development in the region.

- The concept of sustainable use of renewable natural resources provides a basis for addressing societal needs for a healthy ecosystem and a healthy economy.
- Resource management decisions must be ecologically based, conservation-driven, scientifically sound, and risk-averse.
- The watershed is the fundamental management unit for Pacific salmonids; salmon populations are the product from healthy watersheds. However, estuarine and marine habitats through which the salmon migrate must also be considered in management decisions.
- Freshwater, estuarine, and marine habitats must be effectively protected and, where necessary, restored.
- Watersheds must be managed to support a range of compatible land and water uses while protecting downslope and downstream resources.
- Humans must be effectively integrated into the ecosystem through cultural and community awareness, education, ethical responsibility, and adequate legislation and enforcement.
- Communities of place and communities of interest should be empowered in the decision-making process through the implementation of ecosystem-based approaches to fisheries and watershed management.
- The biological and genetic diversity of salmon and steelhead populations must be maintained.
- Habitat protection and restoration initiatives and production-based (rather than allocation-based) harvest management strategies should be used in conjunction with conservation aquaculture and other tools, to restore the production of Pacific salmonids.
- Specific management objectives and quantifiable indicators of progress toward sustainable fisheries should be developed, monitored, and reported.
- Emphasis on mixed-stock fisheries must be reduced where necessary through the development of terminal and stock-specific fisheries which utilize selective harvesting methods.
- Harvest management decisions must be based on high quality information about the productivity of salmon and steelhead stocks.
- Fundamental research into the nature of the relationship between salmon and their environment, and the effects of human activities on that relationship, must be fully supported.
- Institutional structures, legislation, and regulations must be reformed to better support sustainable fisheries.
- An integrated hierarchy of institutions should be established in which the institutions concerned with natural resource management are organized and/or operate at watershed, regional, and coast-wide levels.
- Institutions must have the authority to make decisions, the resources necessary to ensure their implementation, and be held accountable for the results of their actions or inactions.
- Compliance with and enforcement of applicable statutes must be improved.
- A comprehensive set of economic and/or tax incentives for industry and private landowners should be offered to increase compliance with regulations and to foster responsible environmental stewardship.
- Perverse disincentives (e.g., subsidies for irrigation and river transportation) for responsible stewardship and effective management must be eliminated.
- Communication among all of the groups involved in salmon management must be enhanced.

KEY ELEMENTS OF THE SUSTAINABLE FISHERIES STRATEGY

In addition to a long-term vision and guiding principles, the Sustainable Fisheries Strategy also includes a series of strategic actions that should be implemented to support the transition to sustainable fisheries management. The recommended strategic actions are organized into five topic areas, including habitat protection and restoration, harvest management, salmon and steelhead

TABLE 45.1
Organizations participating in the development of the Sustainable Fisheries Strategy.

The organizations that are participating in the development of the Sustainable Fisheries Strategy and Implementation Plan include:

- Acres International Ltd.
- American Fisheries Society *(also including: Alaska, Idaho, Humboldt, North Pacific International, and Portland chapters; Canadian Aquatic Resources Section, Marine Fisheries Section; Western Division)*
- B.C. Hydro
- B.C. Hydro and Power Authority—Kootenay Generation Area
- B.C. Ministry of Agriculture, Fisheries, and Food
- B.C. Ministry of Environment Lands and Parks
- B.C. Ministry of Forests
- B.C. Wildlife Federation
- Boeing Company
- Bonneville Power Administration
- Browning-Ferris Industries
- Bullitt Foundation
- Brainerd Foundation
- Bureau of Reclamation
- Canadian Consulate
- Canadian Department of Transport
- Canadian Forest Service
- Celgar Ltd.
- City of Castlegar
- Coastal Salmon Restoration Group
- Columbia Basin Trust
- Columbia Power Corporation
- Columbia River Inter-Tribal Fish Commission
- Cominco Ltd.
- Commercial Fishing Industry Council
- Confederated Tribes of the Colville Reservation
- Environment Canada
- Fisheries and Oceans Canada
- For The Sake of the Salmon *(including: National Marine Fisheries Service; U.S. Fish and Wildlife Service; U.S. Environmental Protection Agency; Natural Resources Conservation Service; U.S. Forest Service; Bureau of Land Management; Bureau of Indian Affairs; Governor Kitzhaber; Governor Lowry; Governor Wilson; Northwest Indian Fisheries Commission; Coos County (Oregon); City of Portland; King County (Washington); Mendocino County (California); Oregon Forest Industry Council; Washington Forest Protection Association; Portland General Electric; Pacific Power and Light; Seattle City Light; California Forestry Association; Public Power Council; Grant County Public Utility District; Washington Association of Conservation Districts; Northwest Sportfishing Industry Association; Oregon Outdoors Association; Oregon Charterboat Association; Westport Charter Association; Pacific Coast Federation of Fishermen's Associations; Salmon For All; United Anglers of California; Northwest Steelheaders; Trout Unlimited; Pacific Rivers Council; Oregon Trout; Long Live the Kings; California Trout; Friends of the River; Oregon Wildlife Heritage Foundation)*
- Forest Alliance of British Columbia
- Forest Renewal British Columbia
- Greenpeace
- Harder Foundation
- Hatfield Consultants Ltd.
- Idaho Department of Fish and Game
- Institute for Fisheries Resources
- MacMillian Bloedel Ltd.
- National Marine Fisheries Service
- National Roundtable on the Environment and the Economy
- Northwest Ecosystem Institute
- Northwest Power Planning Council
- Oregon Department of Fish and Game
- Pacific Coast Federation of Fishermen's Association
- Pacific Energy Institute
- Pacific Salmon Alliance
- Pacific Salmon Foundation
- Powerex
- Salmon Enhancement and Habitat Advisory Board
- Salmonid Enhancement Task Group
- Save Our Wild Salmon Coalition *(including: Alaska Trollers Association; American Rivers; Antioch Living Systems Collective; Association of Northwest Steelheaders; Boulder-White Clouds Council; Clearwater Forest Watch; Coalition for Salmon and Steelhead Habitat; Coast Range Association; Defenders of Wildlife; Federation of Fly Fishers; Friends of the Earth; Idaho Conservation League; Idaho Rivers United; Idaho Steelhead and Salmon Unlimited; Idaho Wildlife Federation; Institute of Fisheries Resources; Long Live The Kings; The Mountaineers; Natural Resources Defense Council; Northwest Conservation Act Coalition; Northwest Environmental Defense Center; Northwest Resource Information Center; Northwest Sportfishing Industry Association; Oregon Natural Desert Association; Oregon Natural Resources Council; Oregon Outdoors Association; Oregon Trout; Pacific Coast Federation of Fishermen's Association; Pacific Rivers Council; Purse Seine Vessel Owners Association; Rivers Council of Washington; Salmon For All; Salmon For Washington; Sawtooth Wildlife Council; Sierra Club; Sierra Club Legal Defense Fund; Trout Unlimited; Washington Kayak Club; Washington Trollers Association; Washington Wilderness Coalition; Water Watch of Oregon; Western Ancient Forest Campaign); The Wilderness Society*
- Seattle Aquarium Society
- U.S. Environmental Protection Agency

TABLE 45.1 (continued)
Organizations participating in the development of the Sustainable Fisheries Strategy.

- Selkirk College
- Shuswap Nation Fisheries Commission
- Simpson Timber
- Squamish River Watershed Committee
- State of Alaska Governor's Office
- Steelhead Society of British Columbia
- Sustainable Fisheries Foundation
- Triton Environmental Consultants Ltd.
- U.S. Geological Survey
- Washington Department of Fish & Wildlife
- Washington Trout
- West Kootenay Power
- Western Forest Products
- Weyerhaeuser Company Foundation
- Wild Salmon Watch

production, community-based fisheries management, and institutional and regulatory structures. The specific recommendations that relate to each topic are presented in the following sections.

I. **Habitat Protection and Restoration**—Sustainable habitats are key to conserving native populations of salmon and other aquatic organisms. The following definition of sustainable habitat provides a basis for considering specific strategies for protecting and restoring freshwater, estuarine, and marine habitats.

> Sustainable habitat is the physical space and collection of biotic and abiotic processes and entities that constitute a properly functioning ecosystem capable of maintaining itself within the bounds and patterns produced by natural disturbance processes.

Sustainable habitat is self-perpetuating, resilient, and permits the full expression of biological diversity (e.g., life history types, phenotypic and genotypic characteristics, trophic structures, and species assemblages) and production potential, and is spatially linked to other habitats (e.g., a stream entering an estuary, which is linked with the ocean). Habitat management should be based on an ecosystem perspective, that is, managers should address the needs of the larger biological community rather than focus exclusively on individual species. It is more ecologically and economically effective to protect habitat than to restore it, so special emphasis should be placed on establishing salmon habitat protected areas before further damage occurs, including both freshwater and marine refugia. Habitat restoration efforts should rely largely on natural processes and assist the natural regenerative capacity of the ecosystem.

Many general and specific actions needed to support sustainable freshwater, estuarine, and marine habitats in the Pacific Northwest are included in the Sustainable Fisheries Strategy. These recommended actions, which form the basis of a comprehensive strategy for protecting and restoring salmon and steelhead habitats, are summarized below.

I-1 **Increase societal awareness of ecosystem processes and foster the aquatic stewardship ethic**. Several specific actions are needed to achieve this goal, including educating the public and policy makers; advocating a stewardship ethic; forming partnerships between landowners and government; developing clear action plans to foster public support for habitat protection initiatives, and holding politicians accountable for their decisions; and, using appropriate methods for determining the non-market values of fisheries resources and conveying this information to the public.

I-2 **Increase scientific understanding about ecosystem processes, habitat requirements by life stage, and linkages among the physical, chemical, and biological**

components of the ecosystem. Some of the actions that are needed to achieve this goal include evaluating and, if necessary, improving methods and criteria for data collection; conducting more studies to obtain the required knowledge, particularly for watershed analysis; standardizing information reporting procedures; sharing data and information among interested parties; defining the parameters for "healthy habitat" (and compare it to the public's perception of "healthy habitat"); conducting a coastwide assessment of habitats to prioritize protection and restoration initiatives; and, evaluating past/current restoration projects to determine those that achieve the best results.

I-3 **Implement an ecosystem-based approach to habitat management throughout the Pacific region**. Some of the actions that support this goal include defining an overarching goal for sustainable habitat; developing a hierarchy of habitat management objectives at the local, regional, and international levels; developing strategic plans as a means of prioritizing habitat protection and restoration initiatives; developing the capacity to understand and manage whole ecosystems (i.e., develop systems analysis techniques); managing for ecological diversity; coordinating planning and management activities within communities, between agencies, and across jurisdictions; standardizing information reporting and dissemination procedures; and evaluating current habitat management practices, using the best as models for sustainable habitat management.

I-4 **Establish management structures that facilitate meaningful local involvement in habitat management decisions**. Specifically, watershed councils should be established and given the authority to make habitat management decisions, provided that minimum standards are met. In this way, community-based solutions to habitat issues can be encouraged and supported.

I-5 **Reform institutional and regulatory structures and processes so that they support sustainable habitat initiatives**. The specific actions that are recommended include setting up a process to establish minimum standards for habitat quality and quantity; periodically reviewing and, as necessary, revising minimum standards; using watersheds and watershed aggregates (i.e., major river basins) as the primary units for habitat management (a total watershed perspective is needed in which ecological, economic, and social interests are considered); establishing the protection of healthy fish populations and habitat as a top priority, with restoration initiatives considered subsequently; passing stronger legislation to protect all life stages of Pacific salmonids; regulating land exchanges to ensure that no harm comes to fish or their habitat; providing tax incentives to property owners who dedicate land to conservation; using zoning to control development; implementing buy-back programs to obtain lands adjacent to critical salmonid habitats (a fund should be set up by each appropriate government for this); identifying preferred development areas that do not overlap with critical fish habitats; establishing sanctuaries or refugia for habitat conservation and restoration; and, changing the British Columbia Water Act to include provisions for riparian zone protection and protection of water quality on crown lands.

I-6 **Protect salmonid habitats by increasing enforcement and compliance monitoring activities**. Additional funding will be needed to achieve this goal. Societal attitudes will need to change to favor increased enforcement while disincentives for habitat protection need to be eliminated.

I-7 **Restore degraded habitats in accordance with established priorities**. Some of the actions that are recommended to restore habitats include amending the Clean Water Act to facilitate restoration activities that improve water quality (e.g., reducing agricultural run-off); stabilizing upslope and upstream habitats to reduce erosion;

recreating essential spawning and rearing habitats where these have been degraded or destroyed; removing dams where possible and appropriate; restructuring dams and dam operations to facilitate fish passage; seeking alternative energy sources that are more fish friendly; and, restructuring or operating dams to assure that water storage and release operations can maintain downstream ecosystem structure and function for the benefit of salmon and steelhead.

II. Harvest Management—Viable tribal and aboriginal, commercial, and sport fisheries are essential for maintaining the unique culture, communities, and economies of the Northwest. Yet, declines in the abundance of salmon have necessitated a significant abatement of fishing effort in many areas. As a result, many salmon-dependent communities and economies have been severely affected and will continue to be harmed until salmon and steelhead stocks are restored to their full abundance.

Rebuilding and/or sustaining salmon and steelhead populations, and viable fisheries, will require increasing spawner abundance, as well as restoring the habitats upon which they depend, in many areas throughout the Northwest. It is unlikely that our goal of sustainable salmonid populations, sustainable fisheries, and sustainable communities can be achieved within the current harvest management framework. A major philosophical shift is required in harvest management, from emphasizing fishing to emphasizing healthy escapements. The transition to more effective harvest management systems will require a number of other changes, including adoption of an ecosystem-based management system in which the watershed is the essential stewardship unit and local watershed interests are directly involved in fisheries and environmental management decisions. Salmon escapement goals (i.e., how many fish must return to a stream to sustain the run) must be established for each population using a habitat-based conservation approach (i.e., *not* maximum sustained yield for aggregated populations) and must consider non-human uses of salmon and the ecosystem (i.e., biodiversity, wildlife, etc.). Resource managers must adopt a risk averse approach to harvest management, which minimizes the potential for not achieving escapement goals. Restructuring of salmon fisheries is also needed in many cases to reduce mixed-stock fisheries, increase terminal fisheries, emphasize selective harvesting methods, and efficiently employ stock-specific fisheries. Some of the specific strategies that are recommended to address these needs include the following.

II-1 Practice conservation-based rather than exploitation-based harvest management. The first step in this process is to establish "good" escapement goals (i.e., goals that fully utilize the habitat, support biological sustainability, and genetic variability). These goals should be reviewed periodically and refined to reflect changing conditions. Management should be responsive to population vulnerability and explicitly minimize the risks associated with harvesting activities. Importantly, management systems should recognize and respond to the variability of the environment and, hence, fluctuations in salmonid populations.

II-2 Separate allocation decisions from other harvest issues. For harvest management strategies to be successful, decisions on how many fish to catch must be based on good science (i.e., they must not be affected by political pressure). Once these decisions have been made, then it is possible to decide how those fish are to be shared among the various user groups. The Alaska Board of Fisheries provides a good example of an effective fish allocation system.

II-3 Adopt community-based approaches to fisheries management. Communities must be empowered to participate effectively in the fisheries management process. To this end, multi-stakeholder or multi-shareholder processes must be developed

in which participants share in the identification of the problems and creation of innovative solutions. These processes must be open and transparent to foster the honest discussions among the shareholders on motivations, values, knowledge, limitations, and uncertainties. Importantly, linkages among community involvement, empowerment, and accountability must be established, with specific authority devolved to the local level and more general authority retained at the regional level. Minimum standards should be established at higher government levels for habitat protection and other related issues to assure that local decisions on land and water management are consistent with sustainable fisheries and ecosystem management goals. In addition, governmental oversight of community-based decisions is needed to assure that the minimum standards are met. There are several excellent models for integrating communities into the fisheries and environmental management process, including the Alaska Community Advisory Committees (there are 80 committees in all), who advise the Alaska Board of Fisheries, and the Skeena Watershed Committee.

II-4 **Develop harvest management strategies that support sustainable salmonid production**. Some of the actions needed to support sustainable production of salmon and steelhead include establishing and empowering independent organizations to mediate disputes between jurisdictions on salmonid harvest; increasing population-specific management capability by reducing the use of mixed-population fisheries; moving toward terminal fisheries and selective harvesting methods; de-emphasizing the need to harvest all hatchery fish at the expense of commingled wild fish; collecting real-time information on harvest and improve enforcement through shareholder participation; and, restricting harvest by all sectors to increase escapements and ultimately salmonid production.

II-5 **Educate the public on the trade-offs associated with resource management decisions**. It is important that the public recognize that the number of salmon available to harvest depends on many other land and water management decisions. For example, there are direct trade-offs between salmon production and hydroelectric power generation or between housing development and local watershed health. The public needs to be informed about these relationships so they can make informed decisions about the management of watersheds throughout the Pacific Northwest.

III. **Salmon and Steelhead Production**—In response to decreasing natural production resulting from overexploitation and habitat loss, fisheries managers began to turn to artificial production techniques as a means of satisfying the growing demand for Pacific salmon. While releases of juvenile salmonids from production hatcheries, spawning channels, and other facilities dramatically increased survival, the fisheries on these enhanced runs have adversely affected both the numbers and genetic biodiversity of commingled wild salmonid populations. Maintaining high levels of genetic diversity is fundamentally important for achieving sustainable fisheries objectives, particularly in the face of changing climatic conditions on a global scale (that is, seemingly unimportant populations at the edge of the geographic range for each species, may turn out to be the important populations for colonizing altered habitats in the future). For this reason, salmonid production should focus on the conservation and restoration of wild stocks throughout their historic range. The following are key strategies that should be pursued to achieve our goal of sustainable salmonid populations.

III-1 **Increase the natural production of salmon and steelhead.** Some of the specific actions that should be pursued to support this goal include establishing priorities

by comparing existing production with production capacity on a stream by stream basis; improving artificial propagation methods and strategies for tactically applying the improved technology to support sustainable fisheries objectives; and, recognizing that protecting and restoring habitat, while ensuring that optimal numbers of adults spawn in the habitat, is the key to realizing sustainable production goals. The concept of optimal spawner abundance must also include consideration of how the number of carcasses influences freshwater production capacity.

III-2 Ensure genetic diversity of salmon and steelhead populations. Managers, harvesters, and the public must be educated about the importance of preserving genetic biodiversity. In addition, harvest managers should fully consider inherent differences in productivity rates among individual populations whenever management decisions are made that affect population aggregates.

III-3 Refocus hatchery programs where necessary. Instead of focusing on production for harvest, artificial propagation of salmon and steelhead should be directed at helping to restore depressed fish populations (i.e., assist in the realization of conservation goals). Hatchery programs should be modified so they do not compromise either the abundance or genetics of wild stocks. Small-scale, temporary hatcheries should replace the large production hatcheries that have been used in the past. Further refocus efforts to produce quality, rather than quantity of, hatchery fish. Production hatcheries that increase catches without harming wild stocks should be used, at least in the near term, to ease the transition to more sustainable fisheries.

III-4 Enhance communication and education. There is a critical need to deliver the message of sustainability more effectively to the public. It is also important to articulate the long-term implications of unsustainable resource management practices to the public and decision-makers, in a way that will capture their attention and stimulate their involvement. By fostering a better understanding of the issues, an atmosphere can be created where people share the responsibility for the problem and work cooperatively toward creative solutions, potentially including alternative governance systems.

III-5 Create an atmosphere that supports sustainable populations of salmonids. Existing laws and regulations should be assessed and reformed, as needed, to support sustainable fisheries. Communities must be involved in this process to facilitate the development of cooperative solutions and a sense of stewardship. Public education can foster and instill a sense of sustainability from one generation to the next. One of the approaches that can be used to achieve this objective involves integrating these concepts in educational curricula in schools, media forums, and political institutions.

III-6 Reconnect people with natural systems. The absence of support for sustainable resource management practices and our inability to recognize the intrinsic value of ecosystems is linked very strongly to the lack of connectivity between society and the natural environment. Some of the opportunities for reconnecting people with the natural systems include the establishment of nature camps for education and creation of viewing areas at important migration corridors, spawning grounds, and rearing habitats.

III-7 Conduct research on sustainability. There is a need for ongoing research on sustainable agriculture, forestry, mining, and fishing. For such research to generate tangible benefits, however, it must be coordinated among the various jurisdictions involved, conducted by multidisciplinary teams, and be adequately funded. Opportunities should be pursued to develop and communicate to the general public and decision-makers the linkages between local economies and ecosystem health. Community forums and other meetings should be convened to

encourage non-scientists to participate in the identification of critical information gaps, research priorities, and more effective decision-making processes. Importantly, decision-making processes must evolve to recognize the inherent uncertainty and variability associated with the natural environment and, hence, natural fluctuations in salmonid production.

III-8 Recognize and reflect the intrinsic linkages between production, habitat, and harvesting in fisheries management strategies. Importantly, political and institutional structures must evolve to facilitate the implementation of strategies that explicitly recognize these linkages. These strategies must be adaptive to accommodate the variability of natural systems.

IV. Community-Based Fisheries Management—Community-based fisheries management is an essential element of the coastwide Sustainable Fisheries Strategy. When asked why communities should be involved in the management of salmon and steelhead populations and associated habitats, conference participants responded that:

> We must move toward community-based fisheries management to re-establish the link between the authority to manage the resource, the obligation to do it well, and the consequences of failing to do so.

In other words, salmon-dependent communities in both coastal and interior regions are usually most affected by changes in the abundance of the salmonid resource. Therefore, these communities should have a means of participating effectively in decision-making processes related to the management of salmon and steelhead populations and associated habitats—their future depends on it. The following specific strategies are recommended to facilitate a transition toward community-based fisheries management.

IV-1 Convene community workshops to develop a common vision for ecosystem management. Such multi-stakeholder processes will provide a means of defining functional production units and developing partnerships among salmon-based interest groups. These partnerships will be essential for implementing strategies that are designed to support the goals and objectives that are established for each production unit (i.e., using an ecosystem-based approach). In addition, these workshops can be used to gather and disseminate information on each production unit. Such workshops should be convened as soon as possible.

IV-2 Develop effective mechanisms for collecting, maintaining, and disseminating information to community groups and the public. Communities will be empowered by gaining access to information that is related to fisheries and watershed management (including local, traditional, and scientific information). Implementation of this recommendation will require two steps. First, communities should work with agencies to identify their information needs. Then, agencies and communities should work together to identify the most effective means of transferring the necessary information. Development of such mechanisms should be initiated in the near-term.

IV-3 Foster the establishment of environmental ethics and a commitment to responsible stewardship. In addition to effective public education programs, this goal should be advanced through demonstration projects that involve the public and schools. These projects should emphasize ecosystem-based natural resource management and identify the linkages between individuals and the salmonid resource. This is a long-term goal that should be supported by near-term action.

IV-4 Establish mechanisms that facilitate the equitable distribution of the costs and benefits associated with the sustainable management of fisheries resources. That is, communities that bear the costs associated with habitat protection and restoration, resource enhancement, or foregoing the harvest of resources should reap the benefits associated with increased returns of salmon in subsequent years. Similarly, those that derive financial benefits by harvesting and processing Pacific salmon should contribute to the costs associated with their management. Therefore, mechanisms need to be developed that facilitate the fair distribution of costs and benefits. Such mechanisms should consider the costs of freshwater production and the role of pasturage in the ocean. It was recognized that the development of such mechanisms would be a long-term goal. In the near-term, the principle of equitability can be advanced by moving toward terminal and more selective fisheries.

IV-5 Establish mechanisms to provide sustainable funding for community-based fisheries and watershed management initiatives. To be sustainable, resource management must be self-funding and operated on a cost-recovery basis. That is, the true costs associated with resource use must be passed on to the users of land, water, and fish resources. The main potential sources of funding include royalties from harvesters and processors (with costs passed on to the consumer), land users, water users, other resource users, and sportfishing interests (lodges and anglers). However, start-up funding from government agencies will also be needed in the near term to facilitate the development of community-based management systems (e.g., by funding watershed coordinators, etc.).

IV-6 Establish incentives to support sustainable salmonid production. Tax incentives and/or penalties provide an effective means of changing the behavior of land and water users. These should be pursued and, where necessary, reformed. In addition, habitat report cards should be created to evaluate progress toward habitat protection and restoration goals and to identify stakeholders who are contributing to the success of these initiatives. Eco-labeling programs should also be established to identify fish-friendly harvesters, industries, farms, and utilities. Public awareness campaigns, shareholder pressure, boycotts, and legislation should also be used to encourage land and water users to "do the right thing." Opportunities for joint management between local landowners and other community groups should be encouraged through the use of economic incentives.

IV-7 Let others see and respond to the "Common Vision" for sustainable fisheries. This can be accomplished through advertising, including web pages, brochures, ads on TV and radio, magazine articles, and other means. The advertising should include an invitation to participate in the development and implementation of cooperative solutions. Adaptive management workshops should also be convened, which provide computer models as tools to explore "what if" scenarios. A variety of demonstration projects and sites should also be developed. It is critical that we develop some examples of effective, ecosystem-based management, so we can point to them and talk with those who have experienced success.

IV-8 Build broadly-based partnerships that involve all interested environmental agencies, institutions, foundations, and watershed stakeholder groups in this "Common Vision." Most of these groups have existing communication networks. Better communication could be ensured by establishing a list of groups that need to be involved and then developing a strategy to involve them. All interested parties should be invited to participate.

V. Institutional and Regulatory Structures—There is general agreement and ample evidence that our institutions have failed to prevent the decline of Pacific salmon and the deterioration of our watersheds. Therefore, these structures must be reformed if we are to effectively manage our natural resources. This realization underlines the need to identify new mandates and policy objectives by which institutions will be guided, the structural and functional attributes of effective institutions, and the types of institutions best suited to managing human activities at local, regional, and international scales. These goals are reflected in the following broad vision for the future:

> Institutions and an institutional framework must sustain diverse, interjurisdictional fish populations in the future.

By interjurisdictional populations, we mean runs that migrate between jurisdictions within which management authority is exercised (e.g., local management areas, and state, provincial, federal, or international waters). Salmon managers have the difficult responsibility of balancing the conservation and use of the resource, ensuring that fish and fishing opportunities are available to people, and at the same time maintaining the health of the stocks and ecosystems upon which they depend. Working under the premise that existing institutional structures may be incapable of meeting today's challenges, a number of alternative institutional structures for governance of salmon restoration efforts are recommended, including:

V-1 Reform institutional structures, legislation, and regulations to better support sustainable fisheries. Current institutional structures and associated arrangements cannot adequately address the challenges that are facing fisheries managers. This is primarily because many activities affecting habitat and harvest management are outside the purview of existing salmon management agencies. Therefore, the existing decision-making structure must be changed to achieve sustainable fisheries. Reformed management structures must be more consistent with biological realities and must more effectively involve shareholder groups. While consensus decisions are the preferred option, an over-riding authority must have with the power to convene meetings of stakeholders and arbitrate final decisions. Importantly, reformed institutional structures must provide a means of separating conservation decisions (e.g., escapement goals, harvestable surplus, etc.) from allocation decisions. A good example is found in Alaska, where sustained yield is mandated in the state constitution, the Department of Fish and Game sets biologically based escapement goals, and The Board of Fisheries decides allocation issues with input from the Department, public advisory committees, and concerned citizens.

V-2 Alternative management structures should provide an effective means of devolving management authority to the communities. For joint management structures to work, it is important that the responsibilities of participating organizations and the consequences of failing to live up to those responsibilities be clearly identified in associated agreements. It is recommended that reforms in institutional structures take place at three levels to support sustainable fisheries, including the watershed, regional, and coastwide levels. Specific recommendations for new structures are discussed below.

V-3 Watershed Councils should be formed for the specific purpose of developing scientifically credible management plans and environmental standards which apply directly to the local watershed. One of their objectives will be to instill a sense of ownership in the watershed management plan and a sense of responsibility in stakeholders whose activities in the watershed affect salmon survival. It is

important that people recognize their role in restoring and protecting the local environment. The prospects of achieving sustainable fisheries will be greatest if people, businesses, and governments work together at the local level. Such partnerships are the key to success of the new management structures.

Equating watersheds to management units has both theoretical and practical value because salmon populations often segregate by drainage and, more fundamentally, the movement of water and matter is usually confined by gravity to the watershed. This watershed-based approach makes it easier to monitor population abundance, assess terrestrial, riparian, and aquatic impacts, and develop appropriate management prescriptions.

Watershed Councils should include local citizens, landowners, representatives of major stakeholder groups, and representatives of appropriate government agencies. Resource specialists should assist the Councils in developing goals, strategies, and standards for the watershed. The Councils should be able to avail themselves of a "tool box" of resources and approaches to guide their efforts.

Along with the development of a comprehensive management plan, Watershed Councils should be responsible for the preparation and analysis of baseline inventories, the specification of appropriate performance standards (indicators), evaluation of proposed actions and progress toward management goals, coordination with other Watershed Councils, and the integration of their plans with higher institutional levels (e.g., Major Basin Councils; see below). The Councils also need to consult with other institutions on the adequacy of the plans and their joint implementation. The Watershed Councils should prescribe and oversee monitoring and evaluation activities to ensure that sufficient progress is being made or that actions are taken to correct deficiencies. The process would be a dynamic one in which new information gained through monitoring and evaluation would be continually fed into the evolving knowledge base. Council members must be willing to use this information to evaluate the consequences of their actions and to change, if necessary, earlier decisions that were made without benefit of complete knowledge, (i.e., using adaptive management approaches).

V-4 Major River Basin Councils should be established for larger watersheds that have many tributary watersheds—such as the Fraser, Skeena, Columbia, Sacramento, and Yukon rivers—to guide management efforts. As used here, a basin is an aggregation of smaller watersheds to which are applied common management goals, standards, and prescriptions. The designation of a Basin Council is particularly relevant when managing groups of salmon populations whose range spans more than one watershed. The Basin Council should facilitate interjurisdictional cooperation on issues involving transboundary stocks and human activities that transcend individual watershed boundaries.

Establishment of a Basin Council is recommended when the whole can be more effectively managed than the parts (given the options available to the manager), or when management coverage by existing Watershed Councils is inadequate. Examples of areas not likely to be fully addressed by Watershed Councils include main stem reaches of larger rivers and their estuaries.

Basin Councils should include representatives of both government agencies and non-governmental organizations. The overarching purpose of Basin Councils would be to develop and administer management plans that would coordinate the activities and authorities of Watershed Councils and reduce the potential for conflict, duplication, and confusion. As such, the Basin Councils should review and recommend local adaptations and modifications of watershed-based approaches and projects,

provide a source of technical and financial support for watershed management initiatives, and help coordinate and review monitoring and evaluation activities across watersheds. The Watershed Councils should also ensure that the relevant information is incorporated into the management process and should define appropriate performance standards that apply basinwide.

V-5 A North Pacific Conservation Council should be established as a higher order institution with responsibility to coordinate among watershed and basin councils and resolve disputes. The North Pacific Council should be comprised equally of Canadian and U.S. representatives, including both independent scientists and members of specific sectors, including environmental groups, commercial fishing interests, aboriginal organizations, and the academic community. It is important that the representatives on such a North Pacific Council be apolitical and non-partisan to avoid the problems that have historically plagued interjurisdictional management of Pacific salmon. The Council should be funded jointly by federal, state, and provincial governments as part of their ongoing commitment to conservation.

Some of the key responsibilities of a North Pacific Council would be to coordinate the activities of the basin and watershed councils; prepare a "state of the stocks" report annually; prepare a "state of the habitat" report annually; recommend focused research and monitoring programs to address transboundary fisheries management issues (e.g., ocean conditions, offshore harvest, etc.); resolve transboundary disputes; encourage standardization of data collection procedures; and, facilitate access to information. It is likely that the North Pacific Council would also need to be supported by a Secretariat and/or Advisory Committee to assist the Council in fulfilling its mandate.

We recognize that some of the proposed institutional changes are drastically different from existing institutional structures. Significant questions remain regarding the effectiveness of the proposed council-based approach to institutional structures for managing watersheds and fisheries. Success will depend not only on the creativity and energy of stakeholders in the watershed councils, but the willingness of existing fisheries management and research organizations to remain flexible in working with developing councils. Some of the important challenges facing new institutional structures include: establishing new processes for developing annual harvest regulations; maintaining a strong technical basis for decision-making; and ensuring that fisheries research will be responsive to the needs of the councils. Most importantly, successful implementation will require creativity, risk, and courage among political leaders, government agencies, and shareholder groups.

SUMMARY AND CONCLUSIONS

One of the clear messages that has emerged in the information contained in this book, from other sources, and from the in-depth discussions that occurred during the Victoria conference and thereafter, is that Pacific salmon management is an extremely complex undertaking. Salmon and steelhead populations are influenced by a wide range of human activities. In turn, the social, cultural, and spiritual well-being of the people of the Pacific Northwest are inextricably linked to the fate of salmon. Therefore, it is incumbent upon all of us to protect and restore salmon and steelhead populations throughout their range and, in so doing, assure that future generations can fully appreciate this priceless resource.

Most people agree that the existing fisheries and environmental management systems have generally failed to protect salmon and steelhead populations, particularly south of Alaska. Therefore, significant reform of our institutional and regulatory structures is needed to support sustainable fisheries goals. To be effective, these new management structures will need to be based on broad partnerships and embrace input from many different sources. Importantly, effective solutions to the

complex challenges that we are currently facing in the management of Pacific salmon and steelhead populations will require implementation of ecosystem-based approaches to natural resource management. We hope that the Sustainable Fisheries Strategy and this book will provide government agencies, First Nations and Tribal organizations, and conservation and community groups with a framework for sustainable management of our shared fisheries resources. However, its success depends on effective implementation, planning, and cooperative action among all of the partners involved in the process.

While the road to salmon recovery will undoubtedly be long and hard, we can achieve our common vision for the future of salmon and steelhead populations, if we choose to work together in the spirit of cooperation and common purpose. We must—if our children and theirs are to enjoy the benefits associated with sustainable fisheries that we have come to treasure.

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