Findings and Recommendations - National Drought Policy Commission Environmental Issues Group

Executive Summary

This report summarizes the findings and recommendations of the Environmental Issues (EI) Working Group (WG) as input to the work of the National Drought Policy Commission (NDPC) in response to the requirements of Public Law 105-199. It was synthesized based on input from 18 individual members of the EI WG, including the National Drought Mitigation Center, four states (Missouri, New Mexico, Texas, Washington), and 12 federal agencies: U.S. Environmental Protection Agency, Federal Emergency Management Agency, U.S. Army Corps of Engineers, Department of Commerce (DOC) National Oceanic and Atmospheric Administration, Department of Interior (DOI) Fish and Wildlife Service, DOI National Park Service, DOI U.S. Geological Survey, U.S. Department of Agriculture (USDA) Animal and Plant Health Inspection Service, USDA Agricultural Research Service, USDA Farm Service Agency, USDA Forest Service, and USDA Natural Resources Conservation Service. This draft does not presently contain input from other state members of the EI WG, from any tribal members, or from the following federal agencies: DOC National Marine Fisheries Service, DOI Bureau of Indian Affairs, DOI Bureau of Land Management, or DOI Bureau of Reclamation.

The Environmental Issues Working Group was asked to consider and provide pertinent findings and recommendations on issues related to wildfires and water body dependent issues, including ecosystems and fish and wildlife. However, in its discussions, the WG agreed its mandate was broader than this initial charge, and included consideration of any significant environmental issue, not specifically the subject of another WG, that might be triggered by drought occurrence.

Thus, a wide array of issues fall under the purview of this Working Group - arguably a greater diversity of issues than considered by any other Working Group. Because of the large diversity of issues considered here, and also because the environmental responsibilities of WG members are so diverse, this report retains the identity of the member submissions and presents the NDPC with the various perspectives of the EI WG members in relation to the environmental issues requiring careful consideration during drought.

As a consequence, it is not possible to summarize the findings and recommendations of the Environmental Issues Working Group in a few succinct bullets. A wide variety of issues, concerns, and suggestions are presented here for careful consideration by the NDPC. Nonetheless, several broad themes or overarching points do emerge from the work of this group, including the following ten key points:

- A broad array of environmental impacts and concerns must be carefully considered in respect to preparing for and responding to drought emergencies. Careful consideration of all anticipated categories of environmental impacts will allow

decisions to be made as to which impacts can be tolerated, versus those that cannot and which thus must be mitigated.

- In preparing for and responding to drought emergencies, all levels of government (Federal, State, local, tribal) must do a better job of balancing hydrologic and human use issues and needs with a concern for environmental impacts and concerns. Governments must consider impacts to both aquatic and terrestrial ecosystems. Instream flow issues, and impacts to fish and wildlife populations, threatened and endangered species, and ecosystem health and integrity, represent especially critical issues requiring careful analysis in relation to drought. This essentially requires development of ecosystem management guidelines pertinent to drought planning, response, and mitigation.

- Priority must be placed on enhancing the scientific and technical basis for drought planning, response, and mitigation activities. This will involve both increased support for research on an array of relevant topics at appropriate scales of space and time, and development of prediction and planning tools, models, and other research products. Research must be linked to monitoring and observation programs, and to acquisition of improved data on climatic and weather phenomena and on ecosystem processes and biota.

- At present, Federal drought programs lack consistency, and are fragmented and poorly coordinated across the multiple Federal agencies that deal with drought. These programs are also poorly coordinated with State, local, and tribal governments. It is critical that efforts be made to develop a national drought policy, strategy, or framework that specifies responsibilities, capabilities, actions, and coordination across all levels of government, and that also spells out preparedness, response, and mitigation measures to be provided by each government entity. States should develop drought contingency plans to match Federal coordination efforts. This national policy or strategy should be implemented on a watershed basis. A single Federal agency should be identified to coordinate drought preparedness, response, and mitigation activities, without eliminating the unique statutory responsibilities of each agency in relation to drought.

- Drought planning should be conducted within the broader context of watershed-based water resource planning, with strategic, operational, and contingency components. This approach is based on the clear recognition that drought is not a climatic anomaly, but rather part of the overall climatic system that is highly variable in space and time.

- Better forecasting tools and capabilities are required to prepare government entities at all levels to deal with drought emergencies, and to enhance public awareness of the importance of dealing with drought in an effective and coordinated manner. Development of improved forecasting tools and capabilities should be linked with carefully designed observation and monitoring networks.

- Programs and plans for dealing with drought should include both short- and long-term mitigation measures, actions that can reduce system (ecological, hydrologic) vulnerability to drought, and create robust ecological and hydrologic systems capable of withstanding disruption, and on response measures that kick in once a specific drought is deemed to be underway.

- Preparation and planning to deal with the effects of drought are directly related to watershed protection and restoration - healthy watersheds or ecosystems are more able to withstand, and are less severely impacted by, drought conditions as compared to degraded systems.

- We need a consistent and improved definition of drought, one that includes environmental concerns and criteria along with criteria based on human use and needs and on purely hydrologic perspectives.

- Existing drought-related programs at all levels of government should be carefully evaluated, in order to determine whether all important environmental impacts of drought have been identified; if current programs adequately address these priority environmental impacts; whether the measures promoted by existing programs address both short- and long-term mitigation and response measures adequately; whether the right Acustomers@ are being served by current programs; and whether or not the programs are working and why or why not.

Introduction

This report summarizes the findings and recommendations of the Environmental Issues (EI) Working Group (WG) as input to the work of the National Drought Policy Commission (NDPC) in response to the requirements of Public Law 105-199. This report was synthesized based on input received from 18 individual members of the EI WG, including the National Drought Mitigation Center, four states (Missouri, New Mexico, Texas, Washington), and 12 federal agencies: U.S. Environmental Protection Agency, Federal Emergency Management Agency, U.S. Army Corps of Engineers, Department of Commerce (DOC) National Oceanic and Atmospheric Administration, Department of Interior (DOI) Fish and Wildlife Service, DOI National Park Service, DOI U.S. Geological Survey, U.S. Department of Agriculture (USDA) Animal and Plant Health Inspection Service, USDA Agricultural Research Service, USDA Farm Service Agency, USDA Forest Service, and USDA Natural Resources Conservation Service. This draft does not contain input from other state members of the EI WG, from any tribal members, or from the following federal agencies: DOC National Marine Fisheries Service, DOI Bureau of Indian Affairs, DOI Bureau of Land Management, or DOI Bureau of Reclamation.

The Environmental Issues Working Group was asked to consider and provide pertinent findings and recommendations on issues related to wildfires and water body dependent issues, including ecosystems and fish and wildlife. However, in its discussions, the WG agreed its mandate was broader than this initial charge, and included consideration of any significant environmental issue, not specifically the subject of another WG, that

might be triggered by drought occurrence. While most of the issues discussed here relate to wildfires or water bodies, others extend, for example, to drought impacts on terrestrial vegetation and wildlife, and to issues such as modification of grazing management regimes under drought conditions. Critical environmental issues that require consideration and careful analysis in relation to the occurrence of droughts of various magnitudes include requirements for minimum instream flows to protect aquatic biota and channel morphology in streams and rivers; requirements for minimum water levels to protect organisms and ecological processes in ponds, lakes, and wetlands; and drought impacts, in both terrestrial and aquatic ecosystems, to fish and wildlife populations, threatened, endangered and sensitive species, ecosystem health and integrity, and wildfire occurrence.

Thus, a wide array of issues fall under the purview of this Working Group - arguably a greater diversity of issues than considered by any other Working Group. Moreover, several new members were added to the WG in the final week before this initial draft report was due, and input from a number of members was not received until just prior to the initial due date. For all these reasons, it was decided that this report should not synthesize across or suppress the identity of the individual member contributions. Also, because the environmental responsibilities of WG members are so diverse, it seemed appropriate to retain the identity of the member submissions and to present the NDPC with the various perspectives of the EI WG members in relation to the environmental issues requiring careful consideration during drought.

As requested, the report is organized according to the eight ADuties of the Commission@ as listed under Section 4(b) of P.L. 105-199. Where a given duty is not pertinent to the interests or statutory responsibilities of a member, no response is given from that member. If a member's response is pertinent to several sections or duties, this fact is so noted below.

Section 4(b)(1) "determine, in consultation with the National Drought Mitigation Center in Lincoln, Nebraska, and other appropriate entities, what needs exist on the Federal, State, local, and tribal levels to prepare for and respond to drought emergencies"

Comments from National Drought Mitigation Center (NDMC)
Drought effects on the environment can be unrecoverable as in the case of drought impacts on endangered plants and animals. In other cases, such as tree mortality and loss, long recovery times may be necessary. Therefore, mitigation is essential in environmental planning. Response measures may be too late in some cases.

Generally, comprehensive environmental data are essential for appropriate planning. One must know the environment in order to modify or protect it. This may mean increased research funding; increased cooperation among agencies; and sharing and organization of adequate environmental databases. Environmental data must also be available at a scale relevant to drought planning efforts. As pointed out in the Navajo Drought Vulnerability Study, environmental and climatic data are especially inadequate on some tribal lands. Tribes also consistently note that funds are usually lacking for research studies and drought planning.

Environmental data must also be readily available to public and governmental planners. Technical expertise may also be necessary to interpret the information.

Federal, State, Tribal, and local drought planning will reveal specific relevant needs. In terms of time and resources required for planning, especially if drought is not a pressing issue in a particular area, it might make sense to include drought planning with water supply planning or community hazard planning processes.

From a broader perspective, drought will occur whether or not humans are present. Streams will dry up, fish will die, plants will wither, wildfires will occur, terrestrial animals will starve - ecosystems will be disrupted and persist, sometimes with new adaptations. Then people enter the picture. We modify our environments, expect different things from them, and place new limitations on them. For example, we change our environments for our wants/needs often at the expense of the relationships that plants and animals have established. Some species can adapt, others do not. Also, we no longer tolerate widespread wildfires or episodes of mass wildlife deaths. We often can't/won't let nature take its natural course of action.

Drought is a normal part of climate that causes local and regional environmental disruptions. People's actions can modify these disruptions, create new ones, or exacerbate existing effects. People decide what disruptions can/must be tolerated and which cannot. A review of environmental impacts will determine which disruptions are tolerable and which should be addressed. This should be done by a combination of public consensus and science. The NDMC has compiled a list of typical environmental impacts on its web site at http://enso.unl.edu/ndmc/ impacts/impacts.htm#enviro The following is a listing of the types of impacts that may occur:

Damage to animal species

- Reduction and degradation of fish and wildlife habitat
- Lack of feed and drinking water
- Greater mortality due to increased contact with agricultural producers, as animals seek food from farms and producers are less tolerant
- Increased incidence of or susceptibility to disease
- Increased vulnerability to predation (from species concentrated near water)
- Migration and concentration (loss of wildlife in some areas and too many in others)
- Increased stress to endangered species

- Loss of biological diversity

Hydrologic effects
- Lower water levels in reservoirs, lakes, and ponds
- Reduced flow from springs
- Reduced streamflow
- Loss of wetlands
- Estuarine impacts (e.g., changes in salinity levels)
- Increased ground water depletion, land subsidence, and reduced recharge
- Water quality effects (e.g., salt concentration, increased water temperature, pH, dissolved oxygen, turbidity)

Damage to plant communities
- Loss of biological diversity
- Loss of trees from urban landscapes, shelterbelts, and wooded conservation areas
- Increased number and severity of fires
- Wind and water erosion of soils, and reduced soil quality
- Air quality effects (e.g., dust, pollutants)
- Visual and landscape quality (e.g., dust, vegetative cover, etc.)

The Preparedness and Mitigation Working Group of the Western Drought Coordination Council also briefly discusses environmental drought impacts in Appendix A of its "How to Reduce Drought Risk" guidebook (http://enso.unl.edu/wdcc/products/risk.pdf). They discuss a range of impacts including: soils and sediment, surface and ground water levels, air quality, wildlife and plants, and wildfire. *A review of drought-related programs will help to ensure that priority environmental impacts are being addressed.*

Comments from State of Missouri (Department of Conservation)
Current water management by the U.S. Army Corps of Engineers during drought conditions for the Missouri River system mandates releasing water to maintain identified system uses while adversely affecting river fish and wildlife resources. A water release plan addressing fish and wildlife interests during drought conditions within the Missouri River Basin is needed.

What federal regulations/laws are authorized to protect federally endangered species during drought conditions? Loss of instream flows sufficient to maintain federally endangered fish/mussels and other species is an issue that should be addressed at the federal level.

Identify the existence, or lack of, federal regulation(s) addressing the use of fire on federal lands during drought conditions. What are the effects of drought conditions, both positive and negative, on species existing on federal lands?

Comments from State of New Mexico (Forestry Division)
From a state perspective, the following additional skills or needs in predicting weather that creates severe fire behavior would be desirable:

- Fire managers need to know before thunderstorms occur that create 'dry lightning' which is caused when lower level air moisture is not sufficient to produce rain but thunderstorms develop that create fire-igniting lightning. That information would allow prepositioning of fire suppression resources.

- Fire managers need support from the National Weather Service for prescribed fire weather forecasts. In some fuel types, near-drought conditions during cooler periods can offer important opportunities to burn vegetation to improve forest health. Weather forecasts are important to prescribed fire managers for safety reasons.

- Fire managers need to know when high pressure events are unusually high. Erratic fire behavior can occur when this occurs.

Similarly, the following additional skills or needs in recognizing drought effects would be desirable:

- There are drought conditions that indirectly cause insect mortality in live trees. There are probably more acres of trees killed by insects annually in New Mexico than wildfire. When forests are drought stressed, they lack the vigor to repel natural insect attacks. As a result, epidemics occur. By the time aerial detection surveys are conducted, the effects are often in full swing and there is little that can be feasibly done. Improved skill in recognizing drought- stressed forests may offer support for fire and forest managers in developing appropriate responses.

Comments from State of Texas (Texas Natural Resource Conservation Commission)

It would be helpful if state drought response capabilities and needs are presented in the report as well as recognition provided of the primary role of the States in water resource management and allocation decision-making. This would provide a more complete context in which the Commission could make recommendations as to the appropriate role for federal agencies in responding to drought. Given the extent of the existing environmental and drought response programs of States, the most appropriate role for federal agencies to play in responding to drought is to assist state and local water planners and managers with increased funding, technical assistance, and regulatory flexibility. Applicable federal agencies could also assist the border States in achieving greater cooperation with Mexico in stream monitoring and the enforcement of water rights in the Rio Grande and joint efforts to respond to drought, including a system for the international marketing of water and the protection and mitigation of environmental flows.

States such as Texas that have extensive programs to respond to drought and to assess and mitigate related environmental impacts do not need federal templates on what should be required to respond to drought. Rather, they need federal financial assistance to carry out state and locally devised drought response measures. Such assistance is increasingly needed to offset increasing federal demands on other state programs to meet recent and sometimes questionable federal water quality initiatives. With so much that federal agencies could do to constructively assist states, particularly

those in the more drought prone areas of the country, it is discouraging when federal agencies such as the U.S. Bureau of Reclamation spends its time and resources asserting title to the water in the Rio Grande that has been allocated under compact to Texas, Colorado, and New Mexico.

It would also be helpful from a state perspective if the Commission recommended that federal agencies be tasked by Congress to examine ways to provide more regulatory flexibility during times of drought. For example, the U.S. Environmental Protection Agency should consider relaxing temperature and dissolved oxygen criteria when there are low or no flows in streams due to drought or arid conditions. Similarly, public drinking water standards for total dissolved solids could also be relaxed under such conditions. Such regulatory flexibility would not degrade the existing environmental conditions or affect public health and could result in significant resource savings that could be redirected to more pressing environmental needs. I believe the current Clean Water Act and Safe Drinking Water Act can accommodate such flexibility, but it may require specific Congressional direction to achieve it.

In addition the cost-effectiveness of the artificial maintenance of stream or springflow to protect federal listed species needs to be examined. The apparent absence of this ability under the current Endangered Species Act has resulted in the absurdity that the City of San Antonio must develop or otherwise acquire, at the cost of millions of dollars, alternative surface water supplies so that adequate springflows that rely on the Edwards Aquifer can be maintained in the unlikely repeat of the worst drought of record. The development of these alternative supplies will likely have their own environmental impacts that must be mitigated.

Other federal laws such as the National Environmental Policy Act should also be examined in a similar fashion to see whether flexibility could be provided during drought. For example, an exemption could be provided for the funding of projects meant to alleviate drought conditions.

Comments from State of Washington (Department of Ecology)

The impacts of droughts can vary widely in the state of Washington due to the diverse nature of the state and the variability of the circumstances under which droughts might occur. While the state consists of many relatively small watersheds, many of which are quite similar in nature, the effects of drought can differ greatly among them. What is a common characteristic, however, is that all watersheds include fish and wildlife species that are to some degree sensitive to drought.

The key environmental need during drought for Washington at present is the need to protect fish species, primarily salmonid species, that have been listed as threatened or endangered under the Endangered Species Act. Absent some form of water storage that can be manipulated to the benefit of the affected species, the options for providing additional water for fish are limited. Still, there are activities, for example berming or trenching to protect spawning gravels, that can help sustain those fish populations. To the extent that federal programs can assist with those types of protection activities, they

would be invaluable. The downside to some efforts to protect fish, and one that could be controversial, is that they could act to the detriment of existing state (and other) water rights.

The other significant drought-related need in Washington is that of forest health. While wildfire is commonly considered to be a major concern during drought episodes, forest resource officials in Washington tend to view the situation somewhat differently. Wildfire is a concern, but a concern triggered by availability of fuels and meteorological conditions, such as temperature and humidity, rather than simply a lack of precipitation for a sustained period of time. The greater concern arising from drought is pest and disease infestations and other conditions that, over the long term, could adversely affect forest health and increase the likelihood of future wildfires. Because many of the northwest forest ecosystems extend beyond state boundaries, and many of the forests are under federal ownership, the involvement of the federal government in protecting and preserving forest health is invaluable.

Comments from U.S. Environmental Protection Agency (EPA) (OW/OWOW/WD)
A strategy or framework should be developed that integrates responsibilities, capabilities, and action among all levels of government and appropriate watershed groups. This plan should address the preparedness, triggering mechanism, geographic scope, response, and mitigation measures to be provided by each entity, if any, in preparation for and in response to drought conditions. The strategy/framework should be developed broadly, across multi-levels of government, but should focus on implementation on a watershed basis. The drought strategy/framework should be implemented on a watershed basis due to the intuitive (i.e., conceptual) and physical advantages of this approach and because of the national trend toward watershed management.

Comments from Federal Emergency Management Agency (FEMA)
In the Federal government there is a need to develop a National Drought Policy which would eliminate the situational drought disaster response. Currently, available programs are widely scattered among several Federal agencies making application and qualification by States difficult and unduly burdensome. In many instances, potential applicants must endure the bureaucratic process of being passed around from one agency to the next until they reach the agency with the appropriate statutory authority to provide Federal assistance to meet their needs. Even within the Federal government there is confusion on the authorities and programs of various agencies: overlapping program authorities, unfunded or suspended programs, and differing program mandates with respect to the same issue.

To eliminate this confusion, States and multi-task force findings have suggested that the National Drought Policy designate one Federal agency to coordinate a unified Federal approach to disasters. Other approaches towards streamlining the Federal government's approach include refining certain program authorities to make funding

more readily available to those impacted by drought, and by developing and maintaining a compendium of drought assistance programs for reference by Federal, State, and local officials.

Comments from US Army Corps of Engineers (USACE) (Policy & Special Studies Division)

Preparatory planning for droughts is a complex enterprise, consisting of three basic phases or time horizons: *strategic* planning(10-50 years); *tactical or operational* planning and management (seasonal and interannual); and *contingency* planning (real-time operation and decisions under various scenarios and constraints).

Each level of preparation/planning focuses on different management measures. The *strategic* emphasis should deal with issues such as priorities for water withdrawals and uses; implementation of a long-term water conservation strategy; development of ecosystem management guidelines for alleviating the impacts of drought and low flow conditions; the specification of instream flow requirements for various threatened and endangered species and habitats; and other relevant targets for environmental protection during these critical periods. A key aspect here is to get agreement, in advance, as to which existing regulatory constraints, laws, procedures, etc., could or should be relaxed and under what circumstances they may be breached as part of emergency or contingency operations. This may be developed as part of municipal or regional Drought Preparedness plans and exercises conducted to test the responsiveness and shortcomings of current water management systems. The Interstate Commission on the Potomac River Basin (ICPRB) regularly conducts such scenario-driven emergency drought management exercises for the basin and the Metropolitan Washington, DC area.

Operational planning essentially deals with an assessment of the flexibility, reliability, resilience, and robustness of various water management systems to provide for the demands and constraints of the individual needs of the water sector during critical shortage periods. Basically, the questions are about how much water is there; what is the likelihood of continued shortages; what are the demands; which demands are essential; where are the critical demand centers; what are the possibilities for reallocating existing stored water; and what are the means for redistributing and transporting water from areas of availability to areas of need? Operational planning and management requires that emergency drought preparedness exercises be conducted regularly during the normal dry parts of the season and at the onset of droughts.

Contingency planning is essentially the real-time decision making component and adaptation to the evolving drought situation. It deals with the uncertain and unanticipated components of drought management, while adhering to the accepted predetermined decision rules and constraints. Declarations of various drought stages and associated restrictions are closely monitored, as are declarations of drought emergencies which set in motion various new emergency authorities of federal agencies, as well as triggering disaster assistance programs.

Environmental needs are but one component of water demands. During each stage of planning (strategic, operational, contingency), there are different aspects of environmental issues that need to be emphasized. Clearly this is a complex and intertwined problem which cannot be easily segmented. Authorities during emergency situations are quite flexible, but they can be circumscribed as part of a long term strategic plan for drought management. Essentially, the crux of the matter are the conflicts between environmental uses of instream water and both the instream and off stream demands and withdrawals for municipal and industrial water supply, agriculture, power cooling water, hydroelectric power, and navigation. And the key issue during a drought is the priority of needs and withdrawals - i.e., who gets what, and when. The strategic planning component can address the issues of how much each water using sector is entitled to, and how we can rearrange future water use and allocation to serve society's priorities. During the drought itself is not the time to argue those points.

Comments from DOC National Oceanic and Atmospheric Administration (NOAA) (NWS)

There is a need to consolidate various meteorological and hydrologic products currently produced by a number of federal agencies into a single product to increase public and private awareness of developing drought situations. This would provide more timely advance notice of drought problems, enabling more timely preparation for drought responses.

Wildland agencies would benefit from a drought monitoring and prediction program that brings those agencies into a state of readiness for prescribed fire activities and wildfire incident response. The USDA Forest Service Fire Sciences Laboratory in Missoula has developed the Weather Forecast and Analysis System (WFAS) that uses Internet web capabilities to display drought indices such as Haines and Keech Byrum that include fuel moisture and/or stability parameters critical to fire spread. An interagency project to develop a continuum of forecast tools and products that compares antecedent conditions to climatology, including past fire regimes, and extends from outset conditions to long-term seasonal outlooks tied to fire activities, could help mitigate effects and (de)mobilize firefighting resources.

Comments from DOI Fish and Wildlife Service (FWS)

The Fish and Wildlife Service, to fulfill its statutory requirements to conserve fish, wildlife, and plants, needs to inform other agencies during drought emergencies of critical wildlife habitat needs, and water requirements that trust resource populations will require to survive the drought emergency.

At times, effects may be severe enough to prepare contingency plans and coordination of federal contingency plans with local and state plans to ensure optimum survival for wildlife and humans that are affected. The Service will work with other agencies to ensure that existing policies, restrictions, and assistance are provided in ways that ensure survival of trust resources. This would include but may not be limited to: delaying emergency haying on federal lands to ensure nesting success and brood

survival, participating with area landowners in pro-rata share reductions in water deliveries from irrigation sources, cooperation with State and Federal partners on wildfire suppression where resources are available, and enacting measures to control drought opportunistic invasive/nuisance species.

Comments from DOI National Park Service (NPS)
See NPS comments under Section 4(b)(2).

Comments from DOI U.S. Geological Survey (Biological Resources Division) (USGS/BRD)
The USGS/BRD recognizes two major needs in relation to planning for and responding to droughts. First, we need to determine the minimum in-stream flow requirements in streams and rivers and minimum water levels in wetlands, ponds, and lakes that are critical for the continued functioning of aquatic biological communities, especially for species of high state and federal concern (e.g., threatened and/or endangered species, anadromous fish stocks, and those upland species relying on these species for food). This needs to be accomplished at a watershed level to ensure water withdrawals for human consumption are commensurate with minimum flows required for aquatic community sustainability. Extreme drought conditions have the potential to exacerbate habitat loss and subsequent population losses of these important resources.

Second, we need to ensure groundwater recharge and sufficient fresh water entering estuaries and bays to preclude salt water moving further up rivers into otherwise brackish and fresh water environments. The increase in salinity has the potential to force aquatic populations to move away from food sources and to cause a change in vegetative communities over time, potentially affecting the survival of aquatic animal and plant species, including threatened and endangered species; organisms which terrestrial wildlife and humans harvest for food; and species of commercial importance.

Comments from USDA Animal and Plant Health Inspection Service (APHIS)
The need exists to coordinate the planning for, and response to, drought emergencies of Federal, State, local, and tribal groups. To handle a drought situation, it seems prudent to have a National Drought Emergency Management System in place that is similar to the National Animal Health Emergency Management System of the Animal and Plant Health Inspection Service (APHIS). APHIS is the lead federal agency for the animal health emergency management action areas of prevention, preparedness, response, recovery, and mitigation. APHIS partners at the national and local levels with State animal agriculture agencies, animal production industry groups, animal health professional organizations, other Federal agencies, and State and Federal emergency management agencies. The partnership looks at six action areas in developing the emergency management system: (1) Cooperation; (2) Research; (3) Monitoring and Surveillance; (4) Education and Public Awareness; (5) Infrastructure and Training; and (6) Response Plans.

In keeping with the need for coordination, USDA is working as a full partner with the Departments of Commerce and Interior to develop national initiatives that address

problems associated with invasive species (insects, weeds, aquatic organisms, etc.). The National Invasive Species Council has been established, as mandated by Executive Order 13112, and has been charged with developing a National Invasive Species Management Plan which will detail and recommend performance-oriented goals and objectives that would enhance local infrastructure with regard to control and/or eradication of invasive species. The Plan will be developed through a public process and in consultation with stakeholders and other Federal agencies.

Specifically, existing USDA programs will be reviewed to develop specific initiatives for noxious weeds and aquatic organisms, and budget initiatives will be developed to enhance and expand USDA invasive species exclusion and detection capabilities. Invasive species programs will strengthen their ability to coordinate regulatory actions with regard to biocontrol initiatives. Special emphasis will be placed on the development of a National Invasive Species Database, and USDA will help organize Regional Pest Management Centers and oversee a research and education plan for growers.

Comments from USDA Agricultural Research Service (ARS) (Northwest Watershed Research Center)

'Preparation' for drought emergency presupposes understanding and agreement on definition of 'drought' at the appropriate spatial and temporal scales. One low-precipitation summer or low-snowpack winter may result in local water supply deficiencies without regional or national impacts, while long-duration, widespread lack of normal water input (rain and snow) can have obvious regional and national consequences. Science-based definition of drought requires validated, quality-controlled basic climatic and hydrologic data, including that gathered by USDA efforts such as the NRCS SNOTEL system, the NRCS/ARS Soil Moisture/Soil Temperature Network (SCAN), and long-term ARS experimental watershed and hydrologic research programs. Similarly, responses to "drought emergencies" should be developed with full understanding of the immediate and cumulative consequences of specific response strategies for environmental issues at local and regional scales. The information required is developed through a broad spectrum of scientific research from physiology of individual plants and species, to soil/water relationships at the field or catchment scale, to hydrologic regime of watersheds, to basin-wide and regional climate dynamics (watershed, river basin, region, sub-continent).

Environmental sensitivity to inputs and processes -- e.g., climatology, precipitation, snow amount, timing, duration, melt season, evapotranspiration, soil moisture, surface runoff, groundwater recharge -- varies locally, regionally, and by individual crop or environmental component. Better understanding of these forcing factors, and of short- and long-term environmental impacts of drought, as well as identification and discrimination of both short- and long-term environmental consequences of individual and cumulative mitigation practices, will require intensification and coordination of federal/state/academic drought research.

Extensive listings of "environmental issues" associated with drought and with drought mitigation actions are available from many sources including the National Drought Mitigation Center, Western Water Policy Review Advisory Commission, the Western Governors' Association, and the open literature. Drought policy should take full account of the inherent variability of "normal" climate, particularly in the semi-arid and high-elevation sectors of the nation. Drought policy should capitalize on the existing body of scientific knowledge of climate, natural resources, and environmental systems. Drought policy should support an enhanced, cooperative network of long-term research, observation, and monitoring programs led by USDA and coordinated with other Federal, State, river basin, and academic entities. The following additional points are pertinent to the perspective developed here:

- Drought policy should explicitly recognize the dominant role of high-elevation snow in supplying water for all uses throughout the American West.

- Drought policy should explicitly recognize the keystone role of stream corridors and riparian zones, including those of high-elevation headwaters streams, in providing critical habitat and refugee during times of water crisis, and the vulnerability of these environments to improper management during non-drought and drought episodes alike.

- Drought policy should explicitly recognize the linkages among water stress, drought, and other 'environmental perturbations' including wildfire and invasive plant and animal species (exotic or indigenous).

- Drought policy should explicitly recognize social forces and phenomena such as increased human populations in formerly rural or Awild@ settings, increasing public and citizen use of and involvement with land and resource management policy for public lands, and rapidly increasing urban/suburban/wildland fringe contact zones and consequent problems incurred in water allocation, fire control, and noxious species control.

- Drought policy should acknowledge the need for improved science-based understanding of the complex web of landscape, biota, climate, and social structure within which drought manifests itself and within which drought mitigation practices are designed and implemented.

Comments from USDA Farm Service Agency (FSA) (CEPD/CPB)
A framework needs to be developed that integrates actions and responsibilities among all levels of government (federal, state, regional, and local). This policy should plainly spell out preparedness, response, and mitigation measures to be provided by each entity.

Each state needs to develop a drought contingency plan that includes early detection, monitoring, decision-making criteria, short- and long-range planning, and mitigation.

Programs addressing public awareness and education on drought and water conservation should also be included.

A federal interagency group should be established for drought coordination with states and regional agencies. This group should determine the federal government's role in drought response and mitigation. They should also seek to focus federal response and information so that states and local governments have access to 'one-stop shopping.'

Comments from USDA Forest Service (FS) (NFS/WSA, S&PF/FAM, R&D/WFWAR)
Along with other extreme events (e.g., floods, severe storms), drought is a major factor that shapes the structure, composition, and function of ecological systems, both terrestrial and aquatic. Drought-induced extreme low flow events have major impacts on the morphology and hydrologic function of stream channel networks; on the composition, function, and integrity of aquatic ecosystems and biotic communities; and on the chemistry and water quality of streams and lakes. Drought also has major impacts on ecological processes and species populations in riparian zones within forested watersheds, zones which function as major loci of biotic activity and movement, particularly in the arid West. Drought similarly impacts terrestrial systems and processes, leading to major episodes of tree mortality and succession, initiating outbreaks of insects and disease, impairing forest health, causing catastrophic wildfires, and significantly impacting ecosystem productivity and cycling of essential elements. Biotic impacts of drought are particularly acute for threatened, endangered, and sensitive species of fish and wildlife present at low population densities, especially those species that require water or moist habitats to complete critical life history processes. In spite of the importance of these drought-induced ecological impacts, the scientific knowledge base for understanding drought impacts on ecosystem structure, processes, and biota is remarkably incomplete and spotty. Increased research is required not only on the direct and indirect impacts of drought on aquatic and terrestrial ecosystems and biota, but also on ecological responses to and recovery from drought. Research should also focus on better understanding the magnitude of drought that triggers various levels and types of ecological response (useful in terms of defining drought from an environmental as well as from strictly hydrologic and human use perspectives). Such research should span the range of spatial scales from the local forest stand and headwater catchment to the forested landscape. Basic research must be closely linked to monitoring programs designed to evaluate the current condition of ecosystems and resources, and their responses to a variety of human and natural disturbances including drought.

Results of research should be transferred to managers and policy makers charged with planning for, responding to, and mitigating the effects of drought. Drought policy, management, and planning should be firmly grounded in scientific knowledge regarding drought impacts and response, and should take full advantage of available tools and models resulting from scientific research. One particularly critical need in this regard is to better integrate environmental issues, especially instream flow issues but also the array of additional ecological impacts and concerns enumerated in the previous paragraph, into drought planning and decision making. Most drought policy presently

relies heavily on issues relating to impacts to human uses and needs. Such impacts are, of course, critical. But, greater attention must be paid to environmental issues and impacts, with drought planning, mitigation, and response better integrating both human and environmental issues into improved decision making.

With respect to the specific issue of wildfire, preparation for wildland fire emergencies includes planning for, preparing, training, and equipping for normal and above normal circumstances. Federal, State, local, and tribal agencies have the ability to monitor and evaluate weather and vegetative conditions to determine fire danger levels and wildfire potential. Existing mechanisms at the Federal level are available to respond to high wildfire danger conditions, as well as to provide equipment and training to State, local, and tribal agencies. Additionally, FEMA is investigating adoption of a more aggressive role in wildfire preparedness.

Comments from USDA Natural Resources Conservation Service (NRCS)
"Future policies should provide greater opportunity and incentives to proactively integrate drought planning into day-to-day business decisions thereby reducing the effects of drought and reducing the overall response needs to all sectors including: agriculture, water allocation and planning, wildlife and environment" (Western Drought Coordination Council's Report to the National Drought Policy Commission).

"Water conservation measures should not be mandated or applied universally in the absence of specific goals. Rather, water conservation is best viewed as a complement to, not as a substitute for, more traditional water supply development. The objective is the same -- to satisfy the needs of water users in the most cost-effective and efficient manner without adversely impacting public health, safety, or the quality of life and the environment" (Western Governors' Association Drought Task Force Report).

"The NDPC should provide specific ideas which Congress could consider in national legislation to encourage the incorporation of incentives for drought mitigation and preparedness at the local, state and regional levels including educational resources that promote the concepts of drought planning" (Western Drought Coordination Council's Report to the National Drought Policy Commission).

Drought planning and preparation efforts, whether Federal, State, local, or tribal, must consider the needs of the environment as well as agricultural or human considerations. Fish and wildlife resources can be very vulnerable to drought as streams, springs, and ponds dry up due to the weather or de-watering for human use and all available forage or wildlife cover is hayed or consumed by livestock.

Section 4(b)(2) "review all existing Federal laws and programs relating to drought"

The spreadsheet, "Report on Drought Related Programs", which is attached to the reports of the Working Groups, provides a comprehensive summary of existing Federal

programs related to droughts. Only comments that go beyond or further elaborate on material contained in this spreadsheet are presented in this section.

Comments from National Drought Mitigation Center (NDMC)
The focus of the NDMC is to reduce vulnerability to drought by promoting mitigation. That is, the NDMC promotes the use of preventative actions and planning to lessen the impacts of drought when it occurs. NDMC does not necessarily focus on the details of specific environmentally related drought programs. It looks at the concept of drought as a whole and works on issues regarding the reduction of drought impacts and vulnerability. Therefore, the identification and effectiveness of specific drought-related programs are best left to those agencies that deal with them on an ongoing basis. The NDMC works to:

- Help people conceptualize drought;
- Provide information on drought: what it is, what it does, and how to handle it;
- Provide pros and cons to themes and debates in drought management; and
- Help identify gaps in the types of drought management programs.

As for developing programs to handle environmental impacts of drought, the perspective of the National Drought Mitigation Center is that actions should be taken in advance of drought to lessen the potential for environmental impacts. There are short-term and long-term actions that can reduce overall vulnerability to drought. Then there are actions that are implemented when an actual drought is underway. The first actions help create robust systems capable of withstanding disruptions. The second actions help minimize damages from unforeseen or unmitigated impacts. These categories, short- and long-term mitigation and response measures should all be addressed in current program policy. *A review of drought-related programs will help to ensure that all three types of measure are covered.*

As pointed out in the "Report on Drought-Related Programs" attached to these Working Group reports, who/what is going to utilize and benefit from drought programs and the practical limitations of drought programs (i.e., funding) are also important considerations. An assessment of "Customers Served" would determine whether or not programs are focusing on a wide enough audience. There are many things that a wide variety of groups and individuals could be doing to mitigate environmental drought impacts. Finally, an assessment of efficiency, feasibility, and cost/benefit aspects of drought- and environment-related programs would help ensure that programs will work.

Comments from State of Washington (Department of Ecology)
Most of the federal drought response programs that have been employed in Washington have been targeted to human, rather than environmental, needs. While they have been effective in achieving their desired objectives, they were generally undertaken without thought being given to any secondary environmental effects.

One of the problems that Washington has encountered in recent drought events is the lack of consistency in approaching drought from different federal agencies. To begin with, different types of federal drought assistance have different triggers. Secondly,

many programs are designed to address the effects of a drought after the fact rather than seeking to minimize those effects from the outset. Many drought effects may, in fact, be unavoidable, but many could potentially be reduced with early action. While these variabilities have probably not caused too much hardship, the main reason is that recent drought episodes have not been too severe. Were those circumstances different, greater hardships might have resulted.

One area where federal-state cooperation has been very successful in Washington is drought forecasting. The increased availability of information on potential water shortages and indications of the possibility of drought have greatly enhanced the state's ability to prepare for an appropriate level of response should an actual drought event materialize. Because the most recent drought events in Washington have been single year events, the limits of that forecasting ability have not been greatly tested. A multi-year drought event, one that would have longer-term and farther-reaching consequences, might be less easy to predict. However, the improved understanding of long-term climatic trends, such as the El Niño-Southern Oscillation (ENSO) and Pacific Decadal Oscillation (PDO), may provide valuable information about the possibilities for future long-term droughts in the state.

Comments from U.S. Environmental Protection Agency (EPA) (OW/OWOW/WD)
There are few grant and loan programs that may be used to improve water quality and/or fish and wildlife habitats. In instances where increasing preparedness for drought or reducing the impact of drought also improve water quality and/or habitats, they may be eligible for funding by these programs. These grant and loan programs often provide technical assistance and funding to create healthier watersheds (e.g., wetlands, watershed restoration), and healthy watersheds are usually better able to withstand drought.

Comments from Federal Emergency Management Agency (FEMA)
The Robert T. Stafford Disaster Relief and Emergency Assistance Act, P. L. 93-288 (the Stafford Act), was designed by Congress to address the loss of life, human suffering, loss of income, and damage or destruction of property that occur during disasters. To assist communities in recovering from these events, the Stafford Act enables FEMA to provide supplementary Federal assistance to individuals, State and local governments, and certain private nonprofit organizations in recovering from the devastating effects of major disasters.

Section 102(2) of the Stafford Act defines the term major disaster to mean:

> Any natural catastrophe (including any hurricane, tornado, storm, high water, wind-driven water, tidal wave, tsunami, earthquake, volcanic eruption, landslide, mudslide, snowstorm, or **drought**), or regardless of cause, any fire, flood, or explosion, in any part of the United States, which in the determination of the President causes damage of sufficient severity and magnitude to warrant major disaster assistance under this Act to supplement the efforts and available resources of States, local governments, and disaster relief organizations in alleviating the damage, loss, hardship, or suffering thereby. (emphasis added)

For each State request for a major disaster, FEMA must provide a recommendation to the President. FEMA's recommendation is based on several factors (44 CFR '206.37), including whether or not assistance is available from other Federal programs and other sources. In the majority of instances during drought, other Federal agency programs have been more appropriate to address State and local concerns.

The programs activated under a Presidentially declared major disaster are primarily recovery oriented. For instance, individuals may be eligible for temporary housing and home repair assistance (to name just a few areas of assistance). State and local governments, as well as certain private nonprofit organizations, may be eligible for public assistance funding to clear debris; to implement emergency protective measures for the preservation of life and property; to repair or replace public infrastructure, such as streets, bridges, or water control facilities; to repair or replace public buildings and related equipment; to repair or restore public utilities; and to repair or restore public recreational facilities and parks.

In approving funding for these projects after a major disaster declaration, FEMA is required to comply with all other Federally mandated laws including, but not limited to, the National Environmental Policy Act of 1969, the National Historic Preservation Act of 1966, the Endangered Species Act of 1973, the Clean Air Act of 1990, and the Clean Water Act of 1987. In accordance with the Council on Environmental Quality regulations and 44 CFR Part 10, FEMA prepares environmental impact statements or environmental assessments on proposed permanent repair work projects that may have a significant and potentially detrimental impact on the environment. However, most FEMA permanent repair work is categorically excluded from FEMA's environmental requirements, as is the work performed under Emergency Declarations and Fire Suppression Assistance Declarations.

The Fire Suppression Assistance Program, authorized by Section 420 of the Stafford Act, is perhaps the FEMA program of most benefit in dealing with the environmental effects of drought, namely wildfire. Under Section 420 of the Stafford Act, the President is authorized to provide assistance, including grants, equipment, supplies, and personnel, to any State for the suppression of any fire on publicly or privately owned forest or grassland which threatens such destruction as would constitute a major disaster. Under Executive Order 12148, this authority has been delegated to FEMA.

Fire suppression assistance declarations are authorized when an event threatens such destruction as would constitute a major disaster. The threat of a major disaster involves a natural or human-caused event as defined in Section 102(2) of the Stafford Act, which immediately threatens lives and improved property, such as primary residences, businesses, or critical infrastructure. Fire suppression assistance declarations cannot be approved for the protection of agricultural, cultural, and environmental resources.

Comments from US Army Corps of Engineers (USACE) (Policy & Special Studies Division)

There are many laws related to environmental aspects of instream flows, and minimum flows for fish and wildlife needs and aquatic environment B in fact too numerous even to begin to enumerate, because most are site (reservoir) and stream specific. There are many court-ordered constraints (e.g., Delaware River minimum flow) as well as interstate compacts for minimum flows between state boundaries. Most, however, are agreed-to targets, without specific legal standing. That is, during normal conditions, states and agencies agree to provide for instream flow targets to the extent that they do not interfere with the basic legislated purposes of a given reservoir or project.

The key issue is how much flexibility we can build into the basic regulatory decisions involving emergency instream water withdrawals during droughts, especially EPA Section 404 regulations.

Comments from DOC National Oceanic and Atmospheric Administration (NOAA) (NWS)

Existing DOC programs and laws that relate to drought are included in the summary spreadsheet prepared by the NDPC staff. It is noted that there is one DOC program designed to provide benefits to drought victims, and this is administered by the Economic Development Agency. This program has been used infrequently in recent years. In contrast, NOAA has many products that relate to drought, though no single program that deals exclusively with drought on a national scale. Programs that relate to drought within NOAA could be classified as falling into three categories: *observations*, *monitoring*, and *forecasting*.

Observation networks that take and transmit measurements of temperature, precipitation, and other meteorological variables enable the detection of anomalies that lead to drought. Routine and reliable observations are also required to initialize the forecast computer models at the National Centers for Environmental Prediction (NCEP) and other forecast centers around the world. There are a number of networks operating on federal, regional, and state levels, many automated and some manual. Of special note are the several hundred first-order stations operated by the FAA and the NWS, the several thousand cooperative network stations, and a number of automated networks operating regionally or statewide. While most stations take surface weather observations, a recent network established by USDA Natural Resources Conservation Service (NRCS) takes explicit measurements of various parameters, including soil moisture, from around 30 sites across the country.

Monitoring efforts include compiling surface or soil measurements into maps or tables that summarize weather conditions. This information can then be used to assess the extent of significant anomalies. Currently, there are a number of drought indices that are disseminated in tabular and map form via the Internet, NWS Family of Services, DIFAX, and/or publications. These indices generally use temperature and precipitation data to estimate soil moisture anomalies at various depths. Among those indices used, the longest are the Palmer Drought Index (PDI) and the Crop Moisture Index (CMI), both of which are disseminated via publications such as the *Weekly Weather and Crop Bulletin* and over the Internet and DIFAX. There are various forms of Palmer Drought

Index (PDI), but most yield fairly uniform results. The PDI has been calculated for all U.S. climate divisions extending back more than 100 years, making this index especially useful for historical analyses and comparisons. Historical data on precipitation, temperatures, and drought are maintained principally by the NOAA/NESDIS National Climatic Data Center (NCDC) and the Regional Climate Centers (RCCs). Both the RCCs and NCDC disseminate recent and historical data and information via hard copy, magnetic media, and the Internet. Also, a number of federal agencies produce publications or Internet reports analyzing current or recent climatic variations or extremes, including drought. NCDC, the RCCs, and the NOAA/NWS Climate Prediction Center, for example, issue periodic reports that can be used to monitor dryness, as well as special reports on extreme weather events on an ad hoc basis. The NOAA/USDA Joint Agricultural Weather Facility's *Weekly Weather and Crop Bulletin* is especially useful for monitoring U.S. weather conditions, as it includes considerable weather data and information on weekly, monthly, and seasonal time scales. The Web sites operated by CPC, NCDC, the NWS Hydrologic Information Center, and NOAA's Climate Diagnostics Center offer considerable information on current anomalies, including drought.

Though the National Weather Service does not have a drought-specific regional program, two of the NWS regional offices (western and eastern) have drought programs that detail specific actions to be taken when drought develops. Other NWS regions are active during drought, though they do not have formal drought programs. In all cases, NWS personnel work with appropriate state and regional entities, as well as the media and public, in providing information on drought status.

NCEP issues *forecasts* of precipitation, temperature, and other variables that have an impact on drought, but there currently is no specific forecast aimed explicitly at drought. Especially important for monitoring drought, however, are the various Quantitative Precipitation Forecasts (QPFs). These include forecast precipitation amounts for the next 24 hours, the following 24 hours, and the next 5 days. The principal U.S. medium range model, the Medium-Range Forecast (MRF) model, produces forecast rainfall totals out to 2 weeks with varying degrees of accuracy depending on location, time of year, and the various synoptic patterns. The 6-10 day forecast, issued three times per week, offers temperature and precipitation forecasts in categories (e.g., above normal, much above normal, etc.). The recent week-2 forecasts are experimental and are issued as probabilities once a week. The experimental U.S. Threats Assessment provides 3- to 10-day forecasts of significant weather events of interest mostly to emergency managers. These do include areas of significant dryness. CPC also disseminates probabilistic outlooks for monthly temperature and precipitation with a 2-week lead as well as 13 overlapping 3-month forecasts. There are also products that use MRF output to forecast soil moisture, including CPC's experimental soil moisture maps. This recent effort forecasts soil moisture anomalies 1 and 2 weeks in advance. It also monitors daily moisture using the precipitation network from the River Forecast Centers, which includes over 6,000 stations.

Comments from DOI Fish and Wildlife Service (FWS)

Requirement for Emergency Consultation Under the Endangered Species Act (ESA) - A Federal response to emergency drought conditions requires emergency consultation under Section 7 of the Endangered Species Act when listed species and/or their critical habitat may be affected. Guidance on emergency consultations is provided in Chapter 8 of the Endangered Species Consultation Handbook.

Most Federal agencies are now promoting a watershed approach in assessing environmental conditions and conducting habitat restoration. Healthy watersheds and/or ecosystems are more able to withstand, or not be as severely impacted by, drought conditions than are degraded ones. Federal habitat restoration programs can help ameliorate or buffer the effects of drought conditions.

These programs include the FWS Partners for Fish and Wildlife Program and North American Waterfowl Management Plan; USDA Conservation Reserve Program, Wetlands Reserve Program, and Wildlife Habitat Incentives Program; and EPA Small Grants. All these programs result in on-the-ground habitat restoration of wetlands, grasslands, and riparian areas, often done in a watershed restoration context. Habitat restoration can help increase groundwater recharge, surface water retention, and the health of riparian zones, all of which can help buffer the impacts of drought.

Comments from DOI National Park Service (NPS)

The National Park Service (NPS) Organic Act (16 USC 1) directs NPS to "conserve the scenery and the natural and historic objects and wildlife therein and to provide for the enjoyment of the same in such manner and by such means as will leave them unimpaired for the enjoyment of future generations." NPS Management Policies go on to direct NPS to manage natural resources consistent with fundamental ecological processes and allow interference with natural processes in park natural zones only (1) when directed by Congress; (2) in emergencies when human life and property are at stake; and (3) to restore native ecosystem functioning that has been disrupted by past or on-going human activities. As such, to the extent that drought is a natural process, the NPS Organic Act and Management Policies direct NPS not to interfere with this process or its effects (except as noted above). However, that being said, two areas where drought has an impact on NPS management actions include (1) the use of water by visitors and for park administrative purposes, and (2) management of fire. In regard to water use, NPS Management Policies direct NPS to use water efficiently and, in water-scarce areas, use water frugally. When drought conditions exist, NPS units have developed and implemented water conservation and alternative water supply plans. In regard to fire management, during times of severe drought, NPS fire management is modified. Under such conditions, additional fire management staff and equipment are typically requested and fire management becomes strictly "fire suppression" until drought conditions improve and routine fire management, as defined in each park's Fire Management Plan (e.g., prescribed fire or wildland fire for natural resource benefits), is carried out. Further, when parks are expecting to experience long-term extreme fire danger due to drought that may not adequately be met by existing staffing and equipment, a severity assessment and special funding request are prepared and submitted.

It should also be noted that NPS's watershed restoration activities (e.g., restoration of wetlands, floodplains, abandoned mine lands, and other disturbed lands) result in more natural watershed conditions that are better able to cope with or mitigate the impacts of drought.

Comments from USDA Animal and Plant Health Inspection Service (APHIS)
Current authorities enable APHIS to promulgate regulations that protect the health and well-being of U.S. plants, animals, and natural resources. These authorities also enable the Agency to initiate programs that are designed to eliminate or control invasive insects, weeds, pathogens, and other organisms. Specific legislative authorities include: Federal Plant Pest Act; Plant Quarantine Act; Section 102 of Organic Act of 1944; Federal Noxious Weed Act; Golden Nematode Act; Honeybee Act; Title III, Federal Seed Act; Alien Species Prevention and Enforcement Act of 1992; Endangered Species Act; Swine Health Protection Act; Section 306 of the Tariff Act of 1930; Animal Quarantine Laws; Virus-Serum-Toxin Act; Animal Damage Control Act; Lacey Act; and Rural Development, Agriculture, and Related Agencies Appropriations Act of 1988.

Comments from USDA Agricultural Research Service (ARS) (Northwest Watershed Research Center)
USDA Agricultural Research Service (ARS) is the primary agricultural research arm of USDA. ARS drought research is conducted under the broad mandate of the ARS mission, "... to develop and transfer solutions to agricultural problems of high national priority and provide information access and dissemination" in order to:

- ensure high-quality, safe food and other agricultural products;
- assess the nutritional needs of Americans;
- sustain a competitive agricultural economy;
- enhance the natural resource base and the environment; and
- provide economic opportunities for rural citizens, communities, and society as a whole.

The fundamental authority for ARS research, implicitly including drought, is found in: USDA Organic Act of 1862 (7 U.S.C. 2201 note); Research and Marketing Act of 1946, as amended (7 U.S.C. 427. 1621 note); Food and Agriculture Act of 1977, as amended (7 U.S.C. 1281 note); Food Security Act of 1985 (7 U.S.C. 3101 note); Food, Agriculture, Conservation and Trade Act of 1990 (7 U.S.C. 1421 note); Federal Agriculture Improvement and Reform Act of 1996; and Agricultural Research, Extension, and Education Reform Act of 1998 (P.L. 105-108).

ARS research is accomplished through 23 National Programs (see http://www.nps.ars.usda.gov/ programs/table.htm) organized under three broad sectors: Animal Production, Product Value and Safety; Natural Resources and Sustainable Agricultural Systems; and Crop Production, Product Value, and Safety.

Research in each of these sectors contributes to certain aspects of drought assessment and mitigation. National Programs which are directly relevant to the NDPC

Environmental Issues WG include: Animal Germplasm Resources, Conservation, and Development (101); Aquaculture (106); Water Quality and Management (201); Soil Quality and Management (202); Air Quality (203); Global Change (204); Grazinglands Management (205); Integrated Farming Systems (207); Integrated Crop Production and Protection Systems (305); and Animal Production Systems (102).

In the context provided by the above authorities, research sectors, and National Programs, ARS research is organized by individual research programs. Approximately 23 discrete research programs conducted at 20 different locations are conducting research relevant to this NDPC Environmental Issues Working Group.

Comments from USDA Forest Service (FS) (NFS/WSA, S&PF/FAM, R&D/WFWAR)
Two existing Federal laws address, and Federal Property Management Regulations provide (41 CFR 101), Federal assistance to State, local, and tribal agencies for wildland firefighting assistance. Additionally, the Forest Service has internal mechanisms in place that can authorize severity funds and equipment to National Forests that demonstrate abnormally high fire danger.

The Cooperative Forestry Assistance Act of 1978 authorizes the USDA Forest Service [Section 10(b)(1)] to cooperate with State foresters or equivalent State officials in developing systems and methods for prevention, control, suppression, and prescribed use of fires on rural lands and in rural communities that will protect human lives, agricultural crops and livestock, property and other improvements, and natural resources. Additional provisions of this act specify the following:

- Section 10(b)(2) authorizes the FS to provide financial, technical, and related assistance to State Foresters or equivalent State officials, and through them to other agencies and individuals for the prevention, control, suppression, and prescribed use of fires on non-Federal forest lands and other non-Federal lands.
- Section 10(b)(3) authorizes the FS to provide financial, technical, and related assistance to State Foresters or equivalent State officials in cooperative efforts to organize, train, and equip local firefighting forces, including those of Indian tribes or other native groups, in order to prevent, control, and suppress fires threatening human lives, crops, livestock, farmsteads or other improvements, pastures, orchards, wildlife, rangeland, woodland, and other resources in rural areas. As used herein, the term "rural areas" shall have the meaning set out in the first clause of section 306(a)(7) of the Consolidated Farm and Rural Development Act.
- Section 10(b)(4) authorizes the FS to provide financial, technical, and related assistance to State Foresters or equivalent State officials, and through them to other agencies and individuals, including rural volunteer fire departments, to conduct preparedness and mobilization activities, including training, equipping, and otherwise enabling State and local firefighting agencies to respond to requests for fire suppression assistance.
- Section 10(c) specifies that the Secretary of Agriculture, with the cooperation and assistance of the Administrator of General Services, shall encourage the use of excess personal property (within the meaning of the Federal Property and

Administrative Services Act of 1949) by State and local fire forces receiving assistance under this section.

- Under Section 10(e)(2)(A), $70,000,000 is authorized to be appropriated annually to carry out subsection 10(b)(4). Of the total amount appropriated to carry out this subsection,
  (i) one-half shall be available only to State Foresters or equivalent State officials, and through them to other agencies and individuals, of which not less than $100,000 shall be made available to each State; and
  (ii) one-half shall be available only for rural volunteer fire departments.
- Under Section 10(e)(2)(B), the Federal share of the cost of any activity carried out with funds made available pursuant to this paragraph may not exceed 50 percent of the cost of that activity. The non-Federal share for such activity may be in the form of cash, services, or in-kind contributions.
- Under Section 10(f), there shall be established in the Treasury a special rural fire disaster fund that shall be immediately available to and used by the Secretary to supplement any other money available to carry out this section with respect to rural fire emergencies, as determined by the Secretary. The Secretary shall determine that State and local resources are fully used or will be in the disaster fund to assist a State in which one of more rural fire emergencies exist. There are hereby authorized to be appropriated such sums as may be needed to establish and replenish the disaster fund established by this subsection.

The Federal Property and Administrative Services Act of 1949 authorizes the Forest Service to [Section 202(b)(4)] transfer or dispose of such excess property as promptly as possible in accordance with the authority delegated and regulations prescribed by the Administrator. Moreover [Section 202(d)(2)], under such regulations and restrictions as the Administrator may prescribe, the provisions of this subsection shall not apply to the following: property furnished under section 580a of Title 16, in connection with the cooperative Forest Fire control program, where title is retained in the United States.

Under the Federal Property Management Regulations (41 CFR 101), FEPP must be used for wildland and rural fire, and the Forest Service must maintain ownership of the property.

The Research and Development Deputy area of the Forest Service maintains active research programs focused on better understanding impacts of a number of human and natural disturbances, including drought, on forest and aquatic ecosystems nationwide. This research is conducted through six regional Research Stations, the Forest Products Laboratory, and the International Institute of Tropical Forestry, with research organized in over 160 individual research units conducted at over 65 research locations. Much of the agency's drought-related research has been conducted at a network of over 80 experimental forests and watersheds, some of which have continuous research as well as long-term databases on hydrometeorological conditions, streamflow, and a broad array of ecological processes extending over 60 years. Major components of the research effort pertinent to drought occurrence and impacts are conducted in the areas

of Fundamental Plant Science; Quantitative Analysis; Forest and Rangeland Management; Insects, Diseases, and Exotic Weeds; Fire Science; Terrestrial Wildlife Habitat; Aquatic Habitat; Watershed Processes; and Atmospheric Sciences.

Section 4(b)(3) "review State, local, and tribal laws and programs relating to drought that the Commission finds pertinent"

Comments from National Drought Mitigation Center (NDMC)
See NDMC comments under Section 4(b)(2).

Comments for State of Missouri (Department of Conservation)
The Missouri Department of Conservation has a policy addressing municipal use of water taken from Department lakes during drought periods. The policy is stated as follows:

> *"The Department will cooperate with communities and individuals in times of extreme drought emergencies by allowing use of water from Department lakes, as evaluated on a case-by-case basis. Department lakes are not to be viewed as standby sources of public drinking water."*

Environmental issues associated with this policy involve the effects on lake-associated aquatic biota from extended periods of water withdrawal. The policy was established April 1990.

Maintaining sufficient instream flows during periods of drought to sustain stream biota is an important issue and one the Missouri Department of Conservation is addressing. This issue should be recognized as extremely important during drought conditions and should be addressed through a well coordinated effort involving appropriate State and Federal agencies.

The Missouri Department of Conservation maintains daily flights over the State's Ozark Region during dry spring conditions, usually the month of March, to observe and report forest fires. Forest fires are extremely prevalent during drought conditions and can have significant harmful effects on the region's forest, fish, and wildlife interests (e.g., loss of vegetation cover resulting in increased watershed erosion).

Missouri Drought Response Plan, 1995 - Water Resources Report No. 44, addresses the response component of drought planning within Missouri. It defines basic linkages among local, State, and Federal jurisdictions for coordinated planning and response efforts. The plan identifies the effects of drought-produced ground water loss to State streams and stream biota.

Comments from State of New Mexico (Forestry Division)
The State of New Mexico has recently passed legislation that permits municipalities and counties to restrict or ban the sale of fireworks. The law requires use of the Palmer Drought Index (PDI) to meet severe or extreme status. While the PDI is a well

recognized index, it appears to say more about soil moisture than fuel moisture which is of greater interest to fire managers. Also, PDI is too slow to react when fire danger is on a steep increase due to extreme temperatures and winds. On the other side, at the end of a drought, there may be significant surface moisture but PDI may continue to show drought due to the departure from normal. We are interested in a better drought index that combines attributes more responsive to wildfire management needs.

Comments from State of Texas (Texas Natural resource Conservation Commission)

Texas, as do most other states, has extensive drought response and environmental programs. The Dust Bowl era of the 1930s and the subsequent worst drought of record which occurred in Texas during the 1950s led the state to begin strengthening its water planning and management programs. In addition, increased public awareness and appreciation of environmental values that began over two decades ago has now resulted in the routine consideration of environmental impacts when water resource management and allocation decisions are made.

The Texas Natural Resource Conservation Commission (TNRCC) administers the state's water rights and water quality permitting programs. The TNRCC is specifically required by state law to consider impacts to instream uses, water quality, aquatic and wildlife habitat and freshwater inflow needs of bays and estuaries when reviewing and taking action on a water right application. In performing this assessment, the TNRCC consults with the Texas Parks and Wildlife Department. In its action on the application, the TNRCC may place conditions on the water right to avoid or mitigate environmental impacts. Texas law also provides that, upon request of an affected water right holder, these conditions may be temporarily suspended if the petitioner demonstrates that an emergency condition exists and there are no practicable alternatives to the suspension.

The TNRCC also conditions the approval of a water right application with the development and implementation of water conservation and drought contingency plans. All holders of irrigation rights of 1,000 acre-feet per year or more and municipal, industrial and other uses of 10,000 acre-feet per year or more are required by law to develop and implement water conservation plans. All wholesale and retail public water suppliers and irrigation districts are also required by state law to develop and implement drought response plans. The TNRCC, in conjunction with the Texas Water Development Board (TWDB), provides technical assistance to these entities for this purpose. The state has also allocated funds for related educational programs as well as weather modification and brush control projects.

Texas has also integrated environmental protection and drought response in its state and regional water planning efforts. State water planning begins at the regional level. In developing regional options to meet future water needs, regional planning groups develop options to meet environmental flow needs as well as respond to drought. These regional plans are reviewed and approved by the TWDB before they are incorporated into the state water plan. In turn, the TNRCC is required to consider the state water plan when reviewing an application for a water right.

Additionally, an interagency Drought Preparedness Council has been established in Texas to: assess and report on drought conditions in the state; recommend specific provisions for a defined state response to drought-related disasters; advise regional water planning groups on drought-related issues; ensure effective coordination among state, local and federal agencies in drought response planning; and report to the Texas Legislature every two years on significant drought conditions in the state.

Generally, drought response measures fall into two broad categories: water supply and demand management. Both options are properly subject to state and local control. Water supply development is a matter subject to state water rights administration. Drought response includes the curtailment of discretionary, beneficial uses of water in order to protect public health and safety. What constitutes discretionary uses and the timing and extent of their curtailment is a matter for local decision-makers. How to balance public health and safety with instream flow needs during drought should also be matter for state and local water managers and planners.

Comments from State of Washington (Department of Ecology)
The state of Washington has its own set of drought-related laws and regulations that include a statutory definition of drought. The primary objectives of the statute are to "ensure the survival of irrigated crops and the state's fisheries" (Revised Code of Washington [RCW] 43.83B.415).

Drought conditions are defined as occurring when "water supply for a geographical area or for a significant portion of a geographical area is below seventy-five percent of normal and the water shortage is likely to create undue hardships for various water uses and users" (RCW 43.83B.400). Since the state drought statutes are largely focused on irrigated agriculture, Washington's statutory drought definition constitutes something of a hybrid of the meteorological, hydrological, and socioeconomic definitions of drought developed by the National Drought Mitigation Center.

Droughts can be declared in Washington for any "geographical area or part of a geographical area" that is experiencing the water supply conditions specified above. The administrative rules implementing the drought statutes (the Washington Administrative Code, or WACs) provide that the issuance of administrative orders declaring the existence of drought conditions can be for the entire state, individual counties, specific watersheds, or other geographic (or geological or hydrogeological) units than make hydrologic sense.

Most of the activities authorized under Washington's drought statutes have to do with variations on the state's normal water right permitting activities, such as issuing temporary water right permits for the duration of a drought event or permitting the temporary transfer of water rights. The program also includes, however, a grant and loan program that can be used for a number of purposes to minimize the effects of drought. Recently, thought has been given to using the funds from that program in a

more preventive fashion to return waters to enhance flows necessary to support viable fish populations.

Comments from DOI Fish and Wildlife Service
See FWS comments under Section 4(b)(2).

Comments from USDA Agricultural Research Service (ARS) (Northwest Watershed Research Center)
Environmental issues related to drought, and environmental consequences of drought and drought mitigation strategies, transcend political layers and jurisdictions. Research is needed to provide a scientific basis for determination of drought occurrence, severity, and environmental consequences across the suite of biological, physical, and social parameters that comprise integrated ecosystems, at local, tribal, state, and regional levels in diverse biogeographical regions of the nation. Research is necessary to develop and substantiate verifiable drought indices and the rationale for determining appropriate drought mitigation actions at varying political levels (local, Tribal, State, regional) and across varying spatial (watershed, river basin, region, sub-continent) and temporal (annual, multi-year, decadal) scales. Research and model development and application of resource management simulation models suitable for parameterization and validation at varying scales in diverse biogeographic settings (specific examples are available), provide one promising approach for assessing drought programs and consequences at local, tribal, State, and regional levels.

Comments from USDA Forest Service (FS) (NFS/WSA, S&PF/FAM, R&D/WFWAR)
State water rights statutes in the 17 western states where the appropriation doctrine applies are definitely neither 'drought responsive' nor 'drought friendly.' The 'first in time, first in right' principle is a deterrent to a system of ranking beneficial uses in some logical manner, such as domestic water as highest and best use, followed by other uses (e.g., instream flows for channel maintenance and fish habitat protection) in some kind of descending order as defined in State law or regulation. Historically, on several occasions a State governor has suspended State water rights and ordered drinking water be provided citizens before any other use. That can be disruptive if unplanned. States, counties, and tribes should do more and better contingency planning for drought management. The consequences of such plans for fish and wildlife populations and other environmental attributes should receive greater attention than is now the case.

Section 4(b)(4) "determine what differences exist between the needs of those affected by drought and the Federal laws and programs designed to mitigate the impacts of and respond to drought"

Comments from National Drought Mitigation Center (NDMC)
Basically, a comprehensive evaluation of existing programs by the NDMC should include a review to ensure that priority environmental drought impacts are identified and addressed in programs and policies that place an emphasis on short- and long-term mitigation, while still recognizing the need for response measures during times of drought. These actions should be feasible and efficient, and undertaken by those

individuals and programs that can make a difference in reducing environmental vulnerability to drought. Specifically:

- A review of environmental impacts will determine which impacts are tolerable and which should be addressed in relevant programs;
- A program assessment will help to ensure that priority environmental impacts are being accounted for in current programs;
- A program assessment will help to ensure that short- and long-term mitigation measures and response measures are all included in recommended programs and policies;
- An assessment of "Customers Served" would determine whether or not programs are focusing on a wide enough audience; and
- An assessment of efficiency, feasibility, and cost/benefit aspects of programs related to drought and the environment would help ensure that programs will work.

In the case of the Environmental Issues Working Group, we must decide: whether all important environmental impacts have been identified; if current programs adequately address these priority impacts; whether the measures promoted by the programs address both short- and long-term mitigation and response measures adequately; whether the right "customers" are being served; and whether or not the programs are working and why or why not.

Comments from State of Washington (Department of Ecology)
Fish and wildlife populations are almost always stressed by drought events. While those effects have not gone totally unnoticed, they have generally taken a back seat to human needs arising during times of drought. Certainly human needs are an important consideration during drought, but programs designed to provide for human needs need to be evaluated to identify and minimize any secondary environmental impacts. In the northwest, that need has been emphasized even more by the listing of many salmonid species as threatened or endangered. The concern now is that those species not be unduly affected by actions taken to diminish other drought impacts.

In Washington, drought effects occur most often on a watershed or multi-watershed basis depending upon actual hydrologic conditions in specific basins. One of the difficulties the state has encountered during past drought episodes is that the focal point for the delivery of federal assistance has been county governments. That may be unavoidable to some extent, but federal programs should be modified to better acknowledge the essentially hydrological nature of drought. Services may need to be provided through county governments, but they should be made available on a watershed basis as much as possible.

Comments from U.S. Environmental Protection Agency (EPA) (OW/OWOW/WD)
A strategy or framework needs to be developed to promote drought contingency planning and organization. The strategy or framework should emphasize an anticipatory environmental risk management approach to drought management.

Comments from Federal Emergency Management Agency (FEMA)
In the case of FEMA, the differences between the needs of those affected by drought and existing law and disaster assistance programs are considerable. The Stafford Act circumscribes FEMA's authority to assisting State and local governments in lessening the loss of life, human suffering, loss of income, and damage to improved property. The Stafford Act is not designed to address agricultural, cultural, or environmental losses.

It could be argued that the effects of drought impact wildlands and rural communities first, areas where USACE, DOI, and USDA programs have statutory authority to provide assistance. As a result, FEMA's role in drought is limited. Even once drought spreads into urban centers, many other programs are authorized by SBA or covered by States (such as unemployment insurance programs).

Only when there is an unmet need, such as a food and water shortage for communities/individuals and families, has FEMA been able to provided assistance. In 1998, extreme food and water shortages in the Federated States of Micronesia and Republic of the Marshall Islands resulted in a Presidential disaster declaration. FEMA coordinated relief efforts with several other Federal agencies.

Comments from US Army Corps of Engineers (USACE) (Policy & Special Studies Division)
Currently there are few, if any, laws designed specifically to mitigate the effects of drought on aquatic habitats or ecosystems. There are many existing environmental constraints that serve to provide a minimal degree of protection and needs for aquatic ecosystem maintenance. However, the needs of the environment are usually judged to be of a lesser priority than the needs of society during a drought. There are both explicit and implicit priorities expressed and implemented, usually as a consequence of the most intense stages of a drought, when emergency powers and authorities are triggered.

Comments from DOC National Oceanic and Atmospheric Administration (NOAA) (NWS)
NWS has discussed drought issues with meteorologists and hydrologists in the DOI Bureau of Reclamation and U.S. Geological Survey as well as hydrologists in the NWS regions. Some tentative findings follow: a) there is a need for more accurate and more quantitative forecasts of precipitation in order to better forecast runoff and stream flow; b) longer range forecasts should be issued more frequently; c) better information on national drought (location, intensity, etc.) would be helpful; d) verification scores for all forecasts should be made readily available; e) a forecast of the number of hours temperatures will remain above or below freezing would help forecast snow pack and runoff; f) forecasts giving the probabilities of recording various precipitation totals would be useful.

For the wildland fire community, information on long-term patterns and abrupt changes in those patterns are critical for drought preparation, mitigation, and response efforts.

There have been limited efforts made to teleconnect rainfall anomalies to fire occurrences. A probabilistic approach to ascertain risk at various time intervals would be beneficial.

Comments from DOI Fish and Wildlife Service (FWS)
See FWS comments under Section 4(b)(2).

Comments from DOI National Park Service (NPS)
The NPS is currently advancing and Environmental Leadership Initiative that, among other things, includes the development and implementation of park water conservation and alternative water supply plans. In addition, NPS is advancing a Natural Resource Initiative that proposes stepped-up natural resource inventory and monitoring and disturbed lands restoration activities in units of the National Park system.

Comments from USDA Animal and Plant Health Inspection Service (APHIS)
By partnering with stakeholders in both the case of the APHIS National Animal Health Emergency Management System and the National Invasive Species Council, with State Invasive Species Councils eventually established, the needs of those affected by animal health emergencies and invasive species introductions can be addressed. The same could hold true for a National Drought Emergency Management System.

Comments from USDA Agricultural Research Service (ARS) (Northwest Watershed Research Center)
Drought anticipation by persons and institutions potentially affected will be supported by new prediction and planning tools. Anticipation of environmental issues require adequate understanding of the physical and biological processes operative in agricultural ecosystems, of the linkages among water-dependant processes and organisms, and of the consequences of water shortage or deprivation on each component and the holistic ecosystem. Federal, ARS, and collaborating private, Federal, and academic research programs develop the basic knowledge requisite to that understanding, and further provide the basis for developing practices and programs to mitigate and respond to drought. These drought mitigation programs must anticipate downstream (time and place) consequences on the social, biological, and physical components and attributes of the affected system(s).

Comments from USDA Farm Services Agency (FSA) (CEPD/CPB)
A fundamental issue is drought response time and strategic preparation. Federal and State agencies do not have a plan of coordination developed prior to initiation of drought. Each drought program has different eligibility criteria. Response times vary from one program to the next. Program triggering mechanisms should be standardized.

Policy needs to be developed to promote drought contingency planning, emphasizing a more proactive, anticipatory approach to drought management.

We do not have a standard definition of drought, among all levels of government (Federal, State, regional, and local). It would be difficult to identify independent or objective physical criteria that specify when drought conditions exist.

Drought funds should be shifted from drought relief to drought preparedness and mitigation.

We do not have an effective drought risk management program. Farmers and ranchers need to adopt more self-reliant approach to managing climatic variability. We need to ensure risk management tools are available to all farmers and ranchers to make them more self reliant.

A change in policy requires time for communication and change. Farmers and ranchers need to be engaged in the policy process.

There is no national drought plan. The states must develop their own plans for collecting, analyzing, and disseminating information on drought conditions. State plans should linked to the national plan through interagency committee(s) with drought designation responsibility and program administration.

Comments from USDA Forest Service (FS) (NFS/WSA, S&PF/FAM, R&D/WFWAR)
Presently Federal programs targeted at drought response are woefully disjointed, uncoordinated, and perhaps even counterproductive. Federal agencies are able to deal with droughts no more effectively than are States, tribes, cities, or counties. We need some kind of clearinghouse or other mechanism to ensure effective coordination and improved response capabilities. Perhaps a Federal statute targeted solely at drought management would help. While the Congress has frequently funded major water projects in the country and left the details of their operations to BOR or the Corps in many cases, or turned projects over to the States, the fact remains that even these projects are not being well managed to mitigate droughts. None are tightly coordinated with State-owned projects on the same river system. It may be infeasible to expect either State legislatures or the Congress to modify existing State or Federal laws to add drought planning and mitigation provisions to them until a genuine crisis develops that demands their attention.

Federal financial, technical, and physical equipment support to States related to wildland firefighting is provided annually. Sate Foresters have the discretion to manage State and local priorities for receipt of Federal wildland firefighting assistance provided by FS programs.

Relative to the needs identified in Section 4(b)(1), one significant need is to increase funding for research on the impacts of drought on terrestrial and aquatic ecosystems, processes, and biota; on ecological responses to and recovery from drought; and on the magnitude of drought events that trigger various levels and types of ecological response. A second critical need is to better incorporate the results of this research into drought planning and decision making. In particular, environmental issues and

concerns need to receive equal consideration with hydrologic and human use concerns in relation to drought planning, response, and mitigation activities [see FS comments under Section 4(b)(1)].

Comments from USDA Natural Resources Conservation Service (NRCS)
The drought response authority is very limited for the NRCS Emergency Watershed Protection Program (EWP). A legal analysis is needed of the EWP authority for drought and options considered for its implementation. For example, NRCS may be able to request supplemental community assistance funds when a drought is declared for rural water supply.

Drought mitigation or response are not emphasized purposes of the new NRCS conservation programs such as EQIP, WHIP, WRP, and Farmland Protection Program. Drought needs to be re-emphasized as a potential activity in locally led conservation or on-farm planning as alternative practices which can benefit human uses as well as fish and wildlife resources. Practices include pond or spring development, wetland restoration, riparian restoration, and stream habitat restoration. Conservation practice standards also need to be updated for drought preparation, mitigation, and response concerns for environmental issues such as fish and wildlife resources.

On a larger scale NRCS or multi-agency planning at the watershed level allows planners to provide better and longer lasting drought mitigation practices for fish and wildlife resources than can be done at the farm or ranch level. Stream and riparian restoration throughout the watershed can provide excellent mitigation against the ravages of drought in western states by targeting critical stream or riparian habitats with restoration efforts. Restoring these degraded critical stream segments will not only increase habitat and in many cases water quantity and quality for fish but will provide deep holes in the stream channel to provide water for numerous aquatic species in times of drought and allow species to quickly recover as stream flows recover. The restored riparian cover will also provide shade for the stream and food, cover, and water for the endemic wildlife species. Away from the streams ponds can be built and springs developed to provide water for wildlife benefiting them in times of drought as well as in times of normal weather. Food and cover plots can be planted for numerous wildlife species.

The International Drought Information Center conducted a survey in 1992 on how NRCS *(formerly the Soil Conservation Service)* is "fostering the adoption of drought mitigation measures by farmers, ranchers, rural community residents, and others".

The following list summarizes recommendations of the forty-four states on how NRCS should help farmers and ranchers *respond to droughts while preserving environmental quality*. These recommendations range from which farm practices help the most to legal/institutional changes that are needed.

Irrigation Management
- Improve marketing of drip irrigation systems

- Promote irrigation efficiency
- Provide greater technical assistance for water storage for use during irrigation season or for release to augment stream flow
- Promote ground water recharge
- Promote drip irrigation
- Encourage use of sprinkler systems

Water/Land/Crop Management
- Promote crop rotations that enhance infiltration
- Develop ditch storage system
- Increase technical assistance to landowners to assist them in better land management
- Develop water storage structures on streams
- Better management of systems and structures
- Use water from deep aquifers rather than surface water
- Promote adoption of total resource management system plans
- Maintain and establish stream buffers for all land uses
- Develop detention measures in projects that augment stream flows
- Provide assistance to water users to install water measurement devices to ensure diversion of allocated amounts
- Build more structures with gated outlets from bottoms of ponds
- Plan and apply RMS's on watersheds that will have the greatest impacts on water quality and quantity
- Emphasize on-site practices (e.g., residue management, irrigation water management, proper grazing techniques, terraces) that have a direct/indirect benefit in enhancing in-stream flows
- Promote sound land use and conservation measures
- Encourage use of drought-tolerate crops

Legal/Institutional
- Work with state and local government on drought response plans
- Assist in changing water laws to allow farmers to 'market' excess water (i.e., transfer of water between users)
- Promote NRCS as leader in water conservation techniques
- Change attitude with in NRCS of addressing one resource concern (e.g., soil erosion) to one of addressing the entire ecosystem

Education and Training
- Disseminate information that promotes shifts from more to less water-dependent cropping systems
- Provide education and technical assistance on crop irrigation requirements

Environmental Quality
- Promote water quality enhancement and protection
- Balance efficient use of agricultural water with environmental needs

- Promote alternate crops that are in harmony with local environment, reducing the need for irrigation

Data/Information Products/Delivery Systems
- Develop soil moisture monitoring programs
- Assist USGS with low flow monitoring
- Develop and use process simulation models for stream flow forecasting

Section 4(b)(5) "collaborate with the Western Drought Coordination Council and other appropriate entities in order to consider regional drought initiatives and the application of such initiatives at the national level"

Comments from National Drought Mitigation Center (NDMC)
Drought does not recognize political boundaries. The federal government and some states have cooperated on watershed management efforts. This may be especially relevant for environmental issues such as interstate water rights for instream flows. Two examples are the Delaware River Basin Commission (http://www.state.nj.us/drbc/drbc.ht) and the Susquehanna River Basin Commission (http://www.srbc.net/). Although there is currently some redundancy in their drought declaration efforts, as the commissions and the state departments both develop their own drought classifications, more such regional approaches could be explored.

Comments from State of Washington (Department of Ecology)
Washington is already involved in many regional efforts dealing with environmental issues such as the recovery of threatened or endangered species. Any response to drought, including a federal response, that would affect these listed species would need to be regional in nature. Several entities, such as the Northwest Power Planning Council and the Pacific Northwest Wildfire Coordination Group, already exist to coordinate planning for a number of activities among the northwestern states on an ongoing basis. Drought and its effects on fish and wildlife should be part of that planning.

What is lacking at the present is the recognition that droughts are not climatic anomalies, but rather part of an overall climate system that is highly variable. That recognition would make planning for drought an integral part of overall water planning and management rather than an emergency action invoked only when an area is in the throes of a drought. Greater emphasis needs to be placed on initial preparedness for drought, making use of the best possible forecasting technologies, and less on response. Those that might be affected by drought need to make informed choices and be accepting of the consequences of those choices.

Comments from U.S. Environmental Protection Agency (EPA) (OW/OWOW/WD)
Consideration should be given to planning for and implementing drought initiatives on a watershed-by-watershed basis.

Comments from Federal Emergency Management Agency (FEMA)
One aspect of drought impacts which FEMA has worked with States to address is the increased potential for wildfire. In the past, wildfire activity was seen predominately in the western United States. In more recent years, however, fire activity has gradually spread eastward. The significance of this trend is that fire has moved from large national forests and agricultural lands into the wildland/urban interface, where lives and improved property are increasingly at risk.

In the past decade, FEMA has seen an increase in the number of State requests for Fire Suppression Assistance. In the 1980's FEMA would typically receive from 5 to 7 requests per year. In 1998 alone, FEMA processed such 122 requests.

FEMA's role in combating wildland/urban interface fires is to encourage comprehensive disaster plans and programs, to increase the capability of State and local governments in suppressing wildfires, and to provide a greater understanding of FEMA's programs at all governmental levels.

To help prepare for upcoming fire seasons, at the beginning of each year, staff from FEMA's ten regional offices work with State emergency management agencies and/or State divisions of forestry to update all necessary agreements and contact lists, and to provide brief training or a refresher on the program. Pre-season fire preparedness is critical to expedite the fire suppression assistance application process. During fire season, FEMA regional offices maintain contact with the State officials to monitor any situations that develop.

Comments from DOC National Oceanic and Atmospheric Administration (NOAA) (NWS)
Collaboration with the WDCC increased markedly during 1999 as meteorologists at CPC worked with the WDCC Monitoring, Assessment, and Prediction working group and a number of individuals from the WDCC began participating in a new national drought monitoring initiative. Meteorologists from numerous Federal agencies are now maintaining much closer contact on drought issues.

Comments from USDA Animal and Plant Health Inspection Service (APHIS)
This type of cooperation and partnering is inherent to the APHIS National Animal Health Emergency Management System and the intent of a soon-to-be developed National Invasive Species Management Plan.

Comments from USDA Agricultural Research Service (ARS) (Northwest Watershed Research Center)
The causative factors in drought and the deleterious consequences for ecosystems and people cut across man-made jurisdictions. Drought mitigation measures applied at the national or regional level may have unintended adverse consequences at a smaller scale or in a longer time perspective. Collaboration among all entities in analyzing

environmental issues is imperative. This coordinated analysis must be comprehensive and systems-based. Organization by hierarchical "watershed" or hydrologically defined landscape units provides an appropriate conceptual framework which is based on physical and biological reality and allows consideration of the flow of mass and energy in drought-affected systems. Voluntary cooperatives such as the Watershed Management Council, local and regional watershed or basin advisory groups, soil and water conservation districts, and multi-state basin commissions can contribute to this collaboration. Information and data gathered under planning initiatives like the Interior Columbia Basin Ecosystem Management Plan (USDA Forest Service and USDI Bureau of Land Management) should be fully utilized in both development and application of drought mitigation measures for environmental issues.

Comments from USDA Farm Service Agency (FSA) (CEPD/CPB)
Develop a national drought policy or framework that integrates actions and responsibilities among all levels of government (Federal, State, regional, and local). The policy should plainly spell out preparedness, response, and mitigation measures to be provided by each entity.

Comments from USDA Natural Resources Conservation Service (NRCS)
"The activities initiated by the WDCC could be emulated in the remainder of the country as part of a coordinated national effort. With much of the infrastructure already begun through the WDCC's efforts, a national oversight group could provide a clear mandate, management, and resources which would ensure success for a variety of drought related activities on a national level" (Western Drought Coordination Council's Report to the National Drought Policy Commission).

Environmental issues and their needs must be considered at the National as well as State, local, and tribal levels as fish and wildlife resources and critical habitats cross all of these boundaries. All too often fish and wildlife resources receive very little consideration during the time of an emergency as human needs always surpass them in terms of priority. The time to consider our very important fish and wildlife resources is during the planning or preparation phase when resources and time can be dedicated to mitigation efforts and the many agencies and groups have the time to coordinate their efforts with each other and implement needed practices.

"The WDCC recommends that the National Drought Policy Commission (NDPC) consider linking the national oversight group to regional groups for program delivery. Drought and other water issues have greatly different physical characteristics, impacts, political response mechanisms, and thus informational needs, from region to region. These regional perspectives should utilize existing institutions such as the Regional Climate Centers" (Western Drought Coordination Council's Report to the National Drought Policy Commission).

"The NDPC should support the establishment of a statutorily designated lead federal agency, adequately funded, that would coordinate communication and cooperation among the various regional groups, to ensure an absence of duplication and the

encouragement of complimentary actions including establishment of a clearing house, with possible regional subsections" (Western Drought Coordination Council's Report to the National Drought Policy Commission).

Section 4(b)(6) Amake recommendations on how Federal drought laws and programs can be better integrated with ongoing State, local, and tribal programs into a comprehensive national policy to mitigate the impacts of and respond to drought emergencies without diminishing the rights of States to control water through State law and considering the need for protection of the environment@

Comments from U.S. Environmental Protection Agency (EPA) (OW/OWOW/WD)
Drought policy should be implemented on a watershed basis because of the innate advantages of this approach and because of the growing trend toward watershed management in the U.S. The policy should integrate research, planning, management, and sustainable development. Principles of social equity, environmental protection, and participatory decision-making should be stressed in drought mitigation and response programs.

Comments from Federal Emergency Management Agency (FEMA)
FEMA itself has no specific law or program to address drought, particularly drought impacts to the natural environment. However, from this Agency's experience in helping State and local communities recover from major disasters, a recommendation for altering national policy might be to encourage State, local, and tribal organizations to develop comprehensive all-hazard mitigation plans. FEMA encourages mitigation whenever possible. After a major disaster declaration, funding is often made available to States for hazard mitigation projects. States may submit applications to FEMA for wildfire mitigation projects, even if the disaster was not caused by a wildfire. Projects must be in the declared disaster area and must meet HMGP eligibility requirements, but can be utilized for the mitigation of *any* hazard.

Past mitigation efforts have included the following:

- building and vegetation management code development/enforcement;
- vegetation management program development projects; and
- public education programs (fire danger signs, pens and magnets, educational materials for children, etc.).

In order to be eligible, projects must provide a long-term mitigation solution and must be cost-effective. Building code development, nonflammable structure enhancement placement, and the establishment of community rules for vegetation placement are all eligible mitigation projects. Preparedness and equipment do not constitute eligible mitigation projects.

Comments from USDA Animal and Plant Health Inspection Service (APHIS)
Develop a National Drought Management Council, comprised of Federal, State, local, and tribal entities, that is charged with developing a National Drought Management

Plan. The Plan would include the design for a National Drought Emergency Management System.

Comments from USDA Agricultural Research Service (ARS) (Northwest Watershed Research Center)
Integration of laws and programs across local, tribal, State, and Federal levels must be founded on science-based understanding of driving forces and consequences of drought and drought mitigation actions. A national policy must acknowledge regional and local conditions and site-specific circumstances.

Comments from USDA Farm Service Agency (FSA) (CEPD/CPB)
Ensure that drought is an essential element in any national discussion of water policy. This is particularly true for western water policy, where water is critical to the region's sustainability. Drought must be addressed as an integral part of the Western Water Policy Review.

Comments from USDA Forest Service (FS) (NFS/WSA, S&PF/FAM, R&D/WFWAR)
It will be difficult to integrate Federal drought relief programs with the western water rights doctrine of appropriative water law, in that the latter is specifically designed to allocate water during both droughts and wet years to the first water users on a stream that put the water to beneficial use long ago, without regard to what the water was or is presently used for. States guard these laws and resist modernizing them, or tempering them during extremely dry years. Seldom are sufficient instream flows set aside for the protecting the environment and allowed to remain for that purpose during dry years when ecological needs are most critical. States may be willing to make some changes to their instream flow laws if the Federal government would agree to purchase or lease water from willing private sellers during droughts. However, without some financial leverage being provided by new legislation, there may be very little chance for true integration. One clear need for any such efforts at integration is to give more complete consideration to environmental issues and attributes, both aquatic and terrestrial, as opposed to strictly human water use issues and needs, in relation to drought planning, response, and mitigation.

Comments from USDA Natural Resources Conservation Service (NRCS)
Environmental issues incentives as well as other incentives should be established for some types of Federal drought preparation and mitigation programs. Federal drought assistance could be larger or have more favorable cost shares for States, conservation and water districts, private land owners, and other entities that have adopted drought plans or included drought as a primary resource concern to consider during planning.

NRCS needs to include drought preparation, mitigation, and response on an equal basis with other resource concerns or purposes in its area wide conservation and watershed planning and on farm planning. NRCS needs increased funding for conservation technical assistance for droughts during these planning activities. This assistance should include updating practice standards for drought, increasing the use of water resource analysis tools, obtaining better crop management tools for droughts,

and restoring critical segments of stream and riparian habitats as well as other fish and wildlife drought mitigation practices.

Section 4(b)(7) "make recommendations on improving public awareness of the need for drought mitigation, and prevention; and response on developing a coordinated approach to drought mitigation, and prevention, and response by governmental and non-governmental entities, including academic, private, and non-profit interests"

Comments from U.S. Environmental Protection Agency (EPA) (OW/OWOW/WD)
Public awareness and support are key for water suppliers and water users to successfully implement programs to reduce water consumption and to increase the use of recycled water. The public also needs to be aware of economic, environmental, and/or quality of life costs that are incurred by different options for drought mitigation or preparedness.

Comments from DOC National Oceanic and Atmospheric Administration (NOAA) (NWS)
Disseminating better information on the magnitude of ongoing droughts as well as their outlook will help to improve public awareness of the need for drought mitigation and prevention. The current myriad products that relate to drought should be consolidated into a single national product that contains credible and timely information on all existing dry areas that may evolve into drought or have already become drought. The best observation, monitoring, and forecast information should be incorporated into the new drought product, which should be disseminated as widely as possible, using the Internet and official NWS communications procedures. Such a national product, prepared by experts from various Federal agencies in concert with the National Drought Mitigation Center, would likely be used by various private services, such as The Weather Channel, enhancing the potential for widespread use by the public and appropriate state, local, tribal, and other entities interested in drought. The latest forecast technology, including the use of model ensemble outputs of temperature and precipitation, should be used to project significant changes in drought category. The goal is to significantly increase public awareness of the status of current drought and the likelihood for amelioration or intensification. Toward this end, a new drought classification scheme should be considered. Similar to the schemes used for tornadoes and hurricanes, a 4- or 5-category drought scheme would more easily convey pertinent information on drought to the public and emergency workers. Although a one-size-fits-all approach may be inappropriate, some relationship between this drought index, state of fuels, and fire occurrences should be established

Comments from USDA Animal and Plant Health Inspection Service (APHIS)
The National Drought Management Council could have a subcommittee work on developing a public awareness and education campaign.

Comments from USDA Agricultural Research Service (ARS) (Northwest Watershed Research Center)

Improved public awareness of the need for drought mitigation should be based on enhanced public understanding of the complex interrelations among climate, landscapes, and ecosystems; on enhanced, scientifically sound understanding of normal variability of climate particularly in semi-arid and arid regions including much of the American West; and on improved appreciation of the cumulative, complex future consequences of alternative drought mitigation strategies for the nation's environment.

Comments from USDA Farm Service Agency (FSA) (CEPD/CPB)
Provide federal funding for the National Drought Mitigation Center to assist states with drought preparedness, planning, and mitigation. This center should serve as a clearinghouse for information on mitigation, planning, and preparedness activities. Provide a regional/national climate monitoring system, and develop a national/regional database of state drought response resources.

Comments from USDA Forest Service (FS) (NFS/WSA, S&PF/FAM, R&D/WFWAR)
Opportunities for public education and outreach on droughts vary greatly by locale, but generally need substantially increased support. This is especially true in terms of achieving a better balance or integration in consideration of environmental versus human water use issues during drought planning, response, and mitigation. We all recognize the importance of public awareness because public support is essential to successful response to and mitigation of drought effects - people suffer directly and indirectly every time they experience drought conditions. Every generation seems to need to learn this lesson themselves. All sectors of society need to contribute to the public awareness campaign, but not all do. The Federal government's role is probably to contribute funds, direct assistance, expertise, and encouragement to State, tribal, and local people involved. Pre-disaster planning has not worked well in the past and needs to be strengthened.

Comments from USDA Natural Resources Conservation Service (NRCS)
Increase drought educational materials available to conservation partners such as conservation districts, Resource Conservation and Development Councils, and state organizations. NRCS state offices need to establish communication plans to encourage voluntary planning for droughts by private land owners. These efforts will include plans for environmental issues as well as human or agricultural needs.

Section 4(b)(8) "include a recommendation on whether all Federal drought preparation and response programs should be consolidated under one existing Federal agency and, if so, identify such agency"

Comments from U.S. Environmental Protection Agency (EPA) (OW/OWOW/WD)
All drought prevention and mitigation programs should be reoriented on a watershed-by-watershed basis.

Comments from Federal Emergency Management Agency (FEMA)
During our experience working with States and other Federal Agencies on the *Drought of '96* report, several States expressed concern about not having a single Federal

agency to coordinate Federal drought activities. From coordinating disaster assistance for the past 20 years, FEMA supports the idea of uniting drought under one Federal agency that would coordinate the many aspects of drought preparedness, response, and mitigation.

FEMA believes USDA should be appointed as the lead agency, given its variety of programs and the fact that the first effects of drought often appear in the agricultural sector and firefighting efforts. As the lead Federal agency, USDA would be responsible for assessing drought impact and guiding States to the aid programs that do not require a Presidential declaration to activate. USDA would also need to be knowledgeable of the various interagency drought-related programs and would need to provide technical assistance to States in coordination with the other agencies involved. Interagency compacts could be entered into to reflect the triggering authorities and responsibilities of USDA and other involved Federal agencies.

Comments from DOC National Oceanic and Atmospheric Administration (NOAA) (NWS)
In terms of monitoring and predicting drought, the Climate Prediction Center should work closely with USDA and the National Drought Mitigation Center in developing and disseminating a consolidated national drought product. Other agencies will contribute information used in the product, and the final product will in turn go to and benefit these and other agencies involved in drought issues. The national drought status and forecast product will be concise and timely, issued at least every 2 weeks during the warm half of the year and monthly during the cold half.

Comments from USDA Animal and Plant Health Inspection Service (APHIS)
This would not be necessary if a National Drought Management Council is developed, with membership including representatives from relevant Federal, State, local, and tribal groups.

Comments from USDA Farm Service Agency (FSA) (CEPD/CPB)
All Federal drought preparation and response programs should be consolidated and assigned to the Secretary of Agriculture, given appropriate staff and funding. USDA should serve as the agency-in-charge, given its variety of programs and the fact that the first effects of drought often appear in the agricultural sector and in firefighting efforts.

Comments from USDA Forest Service (FS) (NFS/WSA, S&PF/FAM, R&D/WFWAR)
From a strictly environmental perspective, the Forest Service does not think that drought planning and response programs of the Federal government should be consolidated under a single Federal agency or office. Environmental responsibilities related to drought are highly diverse, and are the appropriate statutory responsibilities of many different agencies. However, developing a more effective coordination role, perhaps assigned to a single Federal agency, which would then be responsible for ensuring effective coordination in delivery of Federal drought programs, does have merit.

Comments from USDA Natural Resources Conservation Service (NRCS)

It would be very difficult to consolidate all Federal drought preparation and response programs under a single Federal agency. Many programs are integral components of larger programs that have other purposes, sponsors, participation rules, and methods of delivery. Two examples are the many purposes besides drought that are served by water management practices on farms and operating rules of dams. Droughts are identified and responded to in different ways for various water users such as communities, industry, navigation, agriculture, recreation, and environment. The methods for monitoring and determining when there is a drought differs for each of these water users. Agricultural drought occurs when crops cannot utilize the soil moisture or farmers can no longer make a profit.

It would be useful to have a specific Federal agency as a single point of contact or coordinator for Federal agencies with drought responsibilities. Agency representatives could serve for two years on a core drought response staff at the single Federal agency. Special drought teams could be assembled for responding to major droughts once they are declared or a separate team could be on call for each region of the country. The type of impacts of each drought -- municipal and industrial, agriculture, environment, and transportation -- would determine which agencies and programs would send its people to each team.

It would be very useful to collect a core group of response programs under a single agency. These programs would be aimed at similar types of water users and droughts such as agriculture and rural water supply. This would allow more efficient and effective coordination among these programs in terms of 1) drought declaration formulas, 2) data collection and interpretation, 3) response teams, and 4) cost sharing formulas.