

Department of the Interior

**Agency Specific Procedures
For Implementing the Council on Environmental
Quality's Principles, Requirements, and Guidelines
for Water and Land Related Resources
Implementation Studies**



707 DM 1 Handbook

November 10, 2015

Foreward

This Departmental Handbook supplements Departmental policy chapter 707 DM 1 and provides procedures for implementing water and land related resources implementation studies.

The goal of the Department of the Interior's Agency Specific Procedures (ASP) is to ensure that bureaus and offices consistently apply a common framework for analyzing a diverse range of water resources projects, programs, activities, and related actions involving Federal investments in accordance with the Water Resources Development Act (WRDA) of 2007 (Public Law 110-114). The WRDA specifies that Federal water resources investments shall reflect national priorities, encourage economic development, and protect the environment by:

- 1) Seeking to maximize sustainable economic development;
- 2) Seeking to avoid the unwise use of floodplains and flood-prone areas and minimizing adverse impacts and vulnerabilities in any case in which a floodplain or flood-prone area must be used; and;
- 3) Protecting and restoring the functions of natural systems and mitigating any unavoidable damage to natural systems.

The objectives identified above should be embodied in the Department's new water resource investments, which include both structural and nonstructural approaches to water supply problems, investments in restoration, as well as other water-related investments. The Department-level ASP recognizes that analysis undertaken in support of the Principles, Requirements and Guidelines for Water and Land Related Resources Implementation Studies (PR&G) depends on the availability of resources.

The Handbook is available on the Electronic Library of the Interior Policies (ELIPS) at: <http://elips.doi.gov>

Questions regarding the Handbook should be directed to:

U.S. Department of the Interior
Office of Policy Analysis

Approved: _____



Title: Principal Deputy Assistant Secretary

Date: November 10, 2015

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ACRONYMS

ABM - Agent Based Modeling

AFRP - Anadromous Fish Restoration Program

ASP - Agency Specific Procedures

A/S - PMB - Assistant Secretary – Policy, Management and Budget

BCA - Benefit-Cost Analysis

BIA - Bureau of Indian Affairs

BLM - Bureau of Land Management

BOEM - Bureau of Ocean Energy Management

BSEE - Bureau of Safety and Environmental Enforcement

C&P - *Criteria and Procedures for the Participation of the Federal Government in Negotiations for the Settlement of Indian Water Rights Claims*

CCPs - Comprehensive Conservation Plans

CE - Categorical Exclusion

CEQ - Council on Environmental Quality

CERCLA - Comprehensive Environmental Response, Compensation, and Liability Act 1980

CGE - Computable General Equilibrium

CV - Contingent Valuation

CWPPRA - Coastal Wetland Planning, Protection and Restoration Act

DOI - Department of the Interior

EA - Environmental Assessment

EIS - Environmental Impact Statement

FLPMA - Federal Land Policy and Management Act of 1976

FOIA - Freedom of Information Act

FWCO - Fish and Wildlife Conservation Office (FWS field office)

FWS - Fish and Wildlife Service

FY - Fiscal Year

GHG - Greenhouse Gas

IG - Interagency Guidelines

IM - Instruction Memorandum

MOU - Memorandum of Understanding

NEPA - National Environmental Policy Act

NFHS - National Fish Hatchery System

NIFRMA - National Indian Forest Resources Management Act

NOAA - National Oceanic and Atmospheric Administration

NPS - National Park Service

NPV - Net Present Value

NR - Not Required

NRDAR - Natural Resource Damage Assessment and Restoration

OCS - Outer Continental Shelf

O&M - Operation and Maintenance

OIA - Office of Insular Affairs

OPA - Oil Pollution Act of 1990

OS - Office of the Secretary

OSMRE - Office of Surface Mining, Reclamation and Enforcement

OTS - Office of Trust Services

OWF - Office of Wildland Fire

P&G - Economic and Environmental Principles and Guidelines for Water and Related Land Resources Implementation Studies

P&R - Principles and Requirements for Federal Investments in Water Resources

PR&G - Principles, Requirements and Guidelines for Water and Land Related Resources Implementation Studies

RBWFM - Risk Based Wildland Fire Management

Reclamation - Bureau of Reclamation

SMCRA - Surface Mining Control and Reclamation Act of 1977

ROD - Record of Decision

SOD - Safety of Dams

WRDA - Water Resources Development Act of 2007

WTP - Willingness to pay

I. Introduction and Background

A. Introduction and Goal

The goal of Department of the Interior's (DOI) Agency Specific Procedures (ASP) is to ensure that DOI bureaus and offices consistently apply a common framework for analyzing a diverse range of water resources projects, programs, activities, and related actions involving Federal investments in accordance with the Water Resources Development Act (WRDA) of 2007 (Public Law 110-114). The WRDA specifies that Federal water resources investments shall reflect national priorities, encourage economic development, and protect the environment by:

- 1) Seeking to maximize sustainable economic development;
- 2) Seeking to avoid the unwise use of floodplains and flood-prone areas and minimizing adverse impacts and vulnerabilities in any case in which a floodplain or flood-prone area must be used; and;
- 3) Protecting and restoring the functions of natural systems and mitigating any unavoidable damage to natural systems.

The objectives identified above should be embodied in the Department's new water resource investments, which include both structural and nonstructural approaches to water supply problems, investments in restoration, as well as other water-related investments. The Department-level ASP recognizes that analysis undertaken in support of the Principles, Requirements and Guidelines for Water and Land Related Resources Implementation Studies (PR&G) depends on the availability of resources.

B. Background–Development of the Principles and Requirements, Interagency Guidelines, and the Agency Specific Procedures

In 2015, the Council on Environmental Quality (CEQ) completed an interagency effort to update the 1983 *Economic and Environmental Principles and Guidelines for Water and Related Land Resources Implementation Studies*. This effort led to the development of the Principles, Requirements and Guidelines for Water and Land Related Resources Implementation Studies (PR&G). The PR&G, which govern how Federal agencies evaluate proposed water resource developments, include the following three components:

1. Principles and Requirements for Federal Investments in Water Resources (P&R, 2013) – Overarching concepts that the Federal Government seeks to achieve through policy implementation and requirements for inputs into analysis of Federal investment alternatives;¹
2. Interagency Guidelines (IG, 2014)² – More detailed guidance for affected Federal agencies – the Departments of the Interior, Agriculture, and Commerce; the Environmental Protection Agency,

¹ https://www.whitehouse.gov/sites/default/files/final_principles_and_requirements_march_2013.pdf

² https://www.whitehouse.gov/sites/default/files/docs/prg_interagency_guidelines_12_2014.pdf

the Army Corps of Engineers; the Federal Emergency Management Agency; and the Tennessee Valley Authority – for determining the applicability of the P&R; and

3. Agency Specific Procedures (ASP) – Agency specific guidance for identifying which programs and activities are subject to the PR&G. This document outlines DOI’s ASP.

The P&R, IG, and ASP are statements of policy, not regulations, and are intended to articulate expectations for the internal management of the government. The P&Rs and IG do not impose any legally binding requirements on Federal agencies nor do they create any right or benefit, substantive or procedural, enforceable at law or in equity by any party against the United States, its departments, agencies, or entities, its officers, employees, or agents, or any other person. The P&R, IG, and ASP do not create any rights regarding third parties. Adherence to the DOI ASP may be waived or modified in writing by the AS—PMB (see paragraph G below).

Two key concepts in the PR&G are “Federal investment” and “public benefit.”³ The term “Federal investment” is defined as (IG, p. 4): “...those [investments] that by purpose, either directly or indirectly, affect water quality or water quantity, including ecosystem restoration or land management activities.” The total level of a given investment shall be determined on a present value basis over the life of the Federal investment.

Public benefits encompass environmental, economic, and social goals, include monetary and non-monetary effects and allow for the inclusion of quantified and unquantified measures (P&R, p. 16). In comparison, the previous *Principles and Guidelines* defined “public benefits” in terms of national economic development (NED), where such contributions were defined in terms of increases in the net value of the national output of goods and services, expressed in monetary units. However, contributions to NED include increases in the net value of those goods and services that are marketed, and also of those that may not be marketed. Thus, the approach to quantifying and monetizing benefits in the PR&G and the P&G are *not* significantly different.

Records Management and Freedom of Information Act (FOIA) requirements should be considered throughout the development of PR&G analysis documents, with the inclusion of an index to facilitate the collection of records for any future FOIA requests.

C. Bureau and Office Coverage

All DOI bureaus and offices making Federal investments in water resources are covered by the ASP.

D. Submission of PR&G Analyses to OMB

Under the previous *Principles and Guidelines*, which only applied to the Bureau of Reclamation (Reclamation) but not the other DOI bureaus or offices, certain analyses were submitted to OMB for

³ The P&R and the IG contain definitions of terms used throughout this Handbook. Definitions in the P&R appear on pages 15-16. Definitions in the IG appear throughout the document.

review. These included feasibility-level planning studies and analyses associated safety of dams projects. Other analyses were reviewed on a case-by-case basis by OMB. Under the PR&G, the DOI will continue to submit Reclamation's feasibility studies and safety of dams studies, but will not submit additional types of studies. Submission of PR&G analyses by other bureaus will be on a case-by-case basis.

E. Bureau-Specific Guidance

The PR&G will be implemented somewhat differently across bureaus and offices. Bureaus and offices may supplement this guidance with additional bureau-or office-specific guidance, as appropriate. The bureau-or office-specific guidance should be developed as bureaus and offices review and revise, as necessary, their existing internal guidance and procedures.

Each bureau and office is expected to develop a process and schedule for reviewing its current internal guidance and procedures for consistency with the DOI ASP. The process/schedule should be developed and submitted to the Assistant Secretary-Policy Management and Budget (AS-PMB). Bureau- and office-specific guidelines, once developed, are subject to review by the AS-PMB.

F. Date of Application

The PR&G apply only to plans or projects that are initiated after the PR&G take effect. The PR&G apply to programs or activities beginning at the first program or grant cycle after the PR&G take effect.

G. Exclusions and Exemptions

1. Introduction

This section identifies programs and activities excluded and exempted from the PR&G. Bureaus and offices have the discretion to conduct additional analysis using the PR&G framework, even if the activities/projects are identified as excluded or exempted.

2. Exclusions

The following types of Federal investments are identified in the PR&G (PR&G, Chapter III, Section 2) as excluded from the requirements of the PR&G:

- Regulatory actions (e.g., Endangered Species Act (ESA) Consultations and incidental take permits); While regulatory actions are exempted, the analysis of Federal investments with a nexus to the ESA are not excluded from PR&G analysis.
- Research or monitoring;
- Emergency actions;
- Projects, programs, or plans that meet the threshold criteria for exclusion or that fall below the thresholds identified in Table 1; and
- Additional programs, plans, or projects which the Department has determined do not require PR&G analysis.

The PR&G specifically excludes ESA Consultations and Take Permits. However, inclusion of ESA considerations or implications in a PR&G study does not exclude the Federal investment from PR&G requirements.

3. Exemptions

The following DOI programs are exempt from the requirements of the PR&G due to the existence of an equivalent pathway:

- **Natural Resource Damage Assessment and Restoration (NRDAR).** This program is exempt from PR&G analysis. The NRDAR is governed by a complex set of Federal laws (Comprehensive Environmental Response, Compensation, and Liability Act; the Oil Pollution Act; and the Clean Water Act) and regulations (e.g., 43 CFR 11), which mandate a process for determining injury and assessing monetary damages following an injury to natural resources for which DOI acts as Trustee. These laws and regulations provide an equivalent analytical pathway to the PR&G.
- **Indian Water Rights Settlements.** Analysis of these settlements is exempt from the PR&G. Indian water rights settlements are governed by the *Criteria and Procedures for the Participation of the Federal Government in Negotiations for the Settlement of Indian Water Rights Claims (C&P)*.⁴ The C&P provide an equivalent pathway with a consistent framework to guide Federal participants in evaluating proposed settlements and provide a structured process for establishing negotiation teams, developing background information required to support a claim, evaluating the Federal government's liability and potential costs absent a negotiated settlement, and determining a negotiating position.
- **Bureau of Land Management's Resource Management Plans (RMP).** The Federal Land Policy Management Act (FLPMA) and related regulations provide an equivalent pathway. The FLPMA mandates a process for making public land management decisions and BLM policy ensures that climate change issues and landscape approaches are integrated into the planning process. The RMP are also integrated with NEPA requirements, and are created through an open public process including consultations with tribes, and input from cooperating agencies, interest groups and stakeholders (communities, state and local governments).
- **Wildland Fire.** Non-emergency actions related to fire preparedness, fuels treatments, etc. are exempt from PR&G analysis. DOI's Office of Wildland Fire (OWF), which provides Department level direction, evaluation, and oversight, is developing and implementing common risk management principles to support the National Wildland Fire Cohesive Strategy. This approach, Risk Based Wildland Fire Management (RBWFM), includes three key elements – a common DOI methodology for analyzing risk, DOI and bureau Strategic Business Plans, and performance measures and effectiveness monitoring. The RBWFM applies to all DOI bureaus with wildland fire responsibilities.

⁴ U.S. Department of the Interior. March 12, 1990, *Criteria and Procedures for the Participation of the Federal Government in Negotiations for the Settlement of Indian Water Rights Claims*. Federal Register 55:48: 9223-9224.

- **Ocean Energy Management.** This program is exempt from PR&G analysis. Offshore leasing is governed by the Outer Continental Shelf (OCS) Lands Act, which mandate a complex process for evaluating areas potentially open to leasing, conducting NEPA compliance, receiving public comment, and undertaking economic analysis. The OCS Lands Act and accompanying regulations provide an equivalent analytical pathway to the PR&G.
- **FWS Coastal Wetland Planning Protection and Restoration Act (CWPPRA).** The CWPPRA planning process and resultant projects are required to be consistent with the Louisiana State Master Plan. This master plan includes a Mission, Objectives, and Principles that correlate with the purpose and intent of the Federal Objective and the PR&G. The CWPPRA planning and decisionmaking process meets the purpose and intent of the PR&G for Federal water resource investment, and is exempt from analysis under PR&G.
- **Bureau of Indian Affairs' Forest Management Activities.** Indian forest management is exempt from PR&G analysis. The National Indian Forest Resources Management Act (NIFRMA) of 1990, 25 CFR 163-General Forestry Regulations, and Indian Affairs Manuals and handbooks, provide an equivalent pathway for Indian forest management affecting water and land related resources. Comprehensive forest management plans with written tribal objectives must be approved by the Secretary. Forest management plans and project specific treatments are supported by the appropriate level of NEPA analysis.

4. Process for Requesting Exemptions

The following process should be used by bureaus for requests to exempt programs or activities (beyond those already identified in this document) from the PR&G.

- Exemptions must be justified in writing with a memorandum to the AS—PMB.
- The memorandum must provide the data and rationale for the exemption or exclusion and/or document the equivalent pathway. This includes: summary-level budget and program information on the specific programs/activities for which the request is being sought; the rationale for the request; the implications, if any, associated with the request; and when the request would take effect. If the rationale for exemption is based on the existence of an “equivalent pathway,” the memorandum should document how the equivalent pathway meets the Federal Objective, the Guiding Principles, and the General Requirements.

E. Application of the PR&G to Congressionally Directed Activities

Given that Congressionally directed activities and projects are mandated, bureaus and offices are not expected to prepare a standard PR&G analysis for them. Bureaus and offices may choose to conduct a scaled analysis for such activities.

II. Level of Analysis for DOI Programs

A. Introduction

A PR&G analysis will vary in scope and magnitude across programs and activities. The PR&G identify two levels of analysis: “standard” and “scaled”. In general, the level of analysis should be commensurate with the significance of the Federal investment and the potential environmental impacts. While there is not a clear distinction between the different levels of analysis, the two types of analysis can generally be distinguished in several ways:

- A standard analysis is a comprehensive analysis that seeks to evaluate all of the relevant benefits and costs associated with the project or activity using original or secondary data. The economic analysis techniques used would be those that are normally used in a benefit-cost analysis of programs and activities that have some effect on the environment (e.g., travel cost, hedonics, stated preference approaches).
- A scaled analysis is an analysis that is more limited in scope and would typically rely on benefits transfer methods (p. 40) and secondary data sources. A scaled analysis may be more appropriate for projects or activities that are low cost/low risk, pose minimal threats to human safety, or have minimal environmental effects.

In many cases, professional judgment and available resources will be important factors in determining the appropriate level of analysis. Bureaus and offices should ensure that cumulative effects of many small, routine actions would not elevate those investments to a scaled or standard analysis.

B. Scope and Magnitude of Analysis Required

DOI is adopting the baseline threshold criteria established by CEQ for project and programmatic level analysis shown in [Table 1](#). These thresholds represent guidelines for the level of analysis that is likely to be most appropriate for an activity, given the level of investment in, appropriations for, or cost of that activity. For the purpose of determining whether a given activity or project falls under or exceeds the financial thresholds, it is the level of present value of Federal investment that is the relevant criterion to use. However, for a particular activity, a different level of analysis may be more appropriate and Bureaus may depart from these guidelines where such a departure is justified. In general, a scoping effort should be undertaken to evaluate the level of effort needed to analyze the full range of potential effects.

When collaboration with a Federally recognized tribe(s) is involved, the process should consider the Federal trust responsibility expressed for the Department of the Interior in 512 DM 2.4A under “Reports” that: “...as part of the planning process, each bureau and office must identify any potential effects on Indian trust resources... [and these] must be explicitly addressed in the planning/decision documents...”

Within DOI there are two main categories of activities that will require a PR&G analysis:

- 1) Infrastructure projects that may affect water resources, and
- 2) Grants and programs that may affect water resources.

Project-level analysis should be used for projects and activities for which bureaus have discretion in designing site-specific alternatives for the water resource investment. When the bureaus do not have discretion over the site-specific alternatives or where multiple actions are being addressed in one document, bureaus should use a programmatic-level of PR&G analysis. In some cases, even though a project was included in a programmatic-level analysis, a project-level analysis may be conducted if additional information becomes available, or the specific project varies from alternatives evaluated in the programmatic analysis. Land or resource management plans have an equivalent pathway, however, bureaus could choose to apply the framework of the ASP to the Plans or activities contemplated under the Plans.

Table 1

Financial Thresholds for PR&G Analysis

Type of Activity	Federal Investment (\$M, present value basis) ²	Annual Appropriations or Plan Development Costs (\$M)	Level of Analysis
Projects All new or existing Federal investments, such as infrastructure, ecosystem restoration, new construction, modifications or replacements to existing facilities, and operations and maintenance ¹ .	>20	--	Standard analysis
	10 – 20	--	Scaled analysis
	<10	--	Excluded
Programs Grant or funding programs	--	>100	Standard analysis
	--	50 – 100	Scaled analysis
	--	<50	Excluded
Plans Management plans, such as watershed, master, landscape, etc.	--	>50	Standard analysis
	--	10 – 50	Scaled analysis
	--	<10	Excluded
¹ Operations and Maintenance (O&M) activities that are included in the original project authorizations do not require separate analysis as long as the activity is carried out in a manner that is consistent with that authorization. Significantly changed O&M plans or those changed to meet new goals generally require a new analysis and authorization. ² The IG call for these values to be indexed. For the purposes of DOI PR&G analyses the values should be indexed using CPI-U.			

Projects and activities for which a PR&G analysis is exempted or excluded have been determined based on the extent to which the project or activity: 1) is below the investment thresholds established by CEQ; 2) involves only routine maintenance and repairs; 3) involves only emergency actions; 4) is not a water resource investment; or 5) the extent to which an equivalent pathway exists.

The major types of activities that may require PR&G analysis are listed, by bureau, in Table 2. The table does not include every type of activity or project that each bureau may undertake, therefore; bureaus and offices may have additional types of activities that require PR&G analysis that could be specified in bureau-level guidance.

Grants and programmatic activities should generally be evaluated at program level, as per the IG. Individual grants should not be evaluated, unless they exceed CEQ financial thresholds. The program-level analysis should generally occur on a regular cycle that is appropriate for the specific program or grant and should be documented in the analysis document. Where feasible, reviews might be integrated into program or grant cycles. Retrospective reviews are permissible. If a retrospective analysis indicates that the activities did not provide net public benefits, appropriate steps should be taken to reshape the program or activities.

Table 2**DOI Programs – Level of PR&G Analysis**

Bureau	Activity	Approx. Total Federal Investment Costs	Typical Level of NEPA Analysis	PR&G Analysis	Applicability/Reasoning
BIA	OTS – Forestry	\$10-200K per land management planning project	CE or EA	Exempt	Equivalent pathway (NIFRMA, 25 CFR 163-General Forestry Regulations, and Indian Affairs Manuals and handbooks).
BIA	OTS – Water Resources Management, Planning, and Pre-Development	\$6M total – Individual study costs are typically less than \$100K.	CE, EA, or EIS	Excluded	Under threshold.
BIA	OTS – Hatchery Maintenance	FY13 - \$1.6M Individual projects are less than \$200,000.	CE or EA	Excluded	Under threshold.
BIA	OTS – Hatchery Operations	FY13 - \$4.4M Individual projects are generally less than \$400,000.	EA or EIS	Excluded	Under threshold.
BIA	OTS - ESA	FY13 - \$1.2M Individual projects are generally less than \$125K.	CE, EA, or EIS	Excluded	Under threshold.
BIA	OTS – Rights Protection Initiative	FY13 - \$29M	NR	Excluded	Provides funding for studies.
BIA	OTS – Agriculture, Invasive Species	FY13 - \$3.4M	EA or EIS	Excluded	Under threshold.
BIA	OTS – Water Rights Negotiation/Litigation (Rights Protection)	FY13 \$8M total – Individual negotiation/litigation projects are typically less than \$300K.	CE, EA, or EIS	Excluded or scaled	Not a project. Also, provides funding for studies.

Bureau	Activity	Approx. Total Federal Investment Costs	Typical Level of NEPA Analysis	PR&G Analysis	Applicability/Reasoning
BIA	OTS – Safety of Dams (SOD) Projects	FY13 approx. \$10M – \$23M for construction, allowing for 1 to 4 major construction projects, and \$12M for dam safety activities, and \$1M for maintenance of existing facilities.	EA or EIS	Excluded or scaled	Scaled based on thresholds. SOD activities are generally covered under a nation-wide 404 permit for rehabilitation.
BIA	OTS – Irrigation Project Construction	FY13 \$4.4M – Navajo Indian Irrigation Project is funded annually at \$3.4M and \$1M is split among the 15 existing irrigation projects	EA or EIS	Excluded or scaled	Construction projects would require a scaled analysis at most due to the small individual project size and lack of a detailed NEPA analysis.
BIA	OTS – Agriculture	FY13 - \$25M	CE, EA, or EIS	Standard or scaled	Threshold based
BIA	OTS – Tribal Management Development Program	FY13 - \$7.6M	NR	Excluded	Base funding; not in itself a project
BLM	Resource Management Plans	\$1M-\$2M/planning area	EIS	Exempt	Existing FLPMA planning process provides an equivalent pathway.
BLM	Watershed Management/Restoration	\$10K to \$500K/project	EA	Excluded	Under threshold.
BLM	Water Supply Development	\$10K to \$250K/project	EA	Excluded	Under threshold.
BLM	Land Transfers and other Realty Actions	Varies	EIS or EA	Scaled	If these are determined to be Federal investments, the level of analysis will be scaled based on thresholds.
BLM	Dam Safety/Maintenance	\$50K-\$2M/project	EIS or EA	Scaled	Scaled analysis based on project costs.
BLM	Major Rights-Of-Way for	Varies	EIS or EA	Scaled or standard	Scaled analysis based on project costs.

Bureau	Activity	Approx. Total Federal Investment Costs	Typical Level of NEPA Analysis	PR&G Analysis	Applicability/Reasoning
	Infrastructure				
BLM	Fluid/Solid Mineral Production	Varies	EIS or EA	Excluded, scaled or standard	Generally below threshold. Some projects might receive either a scaled or standard analysis.
BLM	Timber, grazing	Varies	EIS or EA	Excluded, scaled or standard	Generally not Federal investments, however, depending upon overall project scope and degree of water resources impact, some projects or activities might receive either a scaled or standard analysis.
BOEM and BSEE	Offshore energy leasing	Varies	CE, EA, or EIS	Exempt and excluded	Equivalent pathway. Extensive analysis is undertaken in Five Year Plans and associated documents, as required by the OCS Lands Act. All BSEE activities are either research or regulatory.
FWS	Endangered Species – Candidate Conservation	\$11.5 M	CE, EA, or EIS	Excluded	Mostly research and monitoring activities, not water related.
FWS	National Wetlands Inventory	\$3.47M	NR	Excluded	Mapping program
FWS	Coastal Barrier Resources Act	\$0.89M	NR	Excluded	Mapping program
FWS	Conservation Planning Assistance	\$32.0M	CE, EA, or EIS	Excluded	Funding for individual projects is under threshold.
FWS	Partners for Fish and Wildlife	\$51.8M	NR	Scaled & programmatic	Potential candidate for retrospective programmatic review or cumulative impacts analysis.
FWS	Coastal Program	\$13.2M	NR	Excluded or Scaled & programmatic	Excluded because individual projects below the threshold; or candidate for tiered or grouped programmatic review for restoration planning & conservation activities.
FWS	Comprehensive Conservation Plans (CCPs)	\$3M	EA/EIS	Excluded	Individual plans are under the threshold.

Bureau	Activity	Approx. Total Federal Investment Costs	Typical Level of NEPA Analysis	PR&G Analysis	Applicability/Reasoning
FWS	Refuge O&M	\$131.5M	CE, EA, or EIS	Scaled, standard, or programmatic	Candidate for cumulative impacts analysis on a case-by-case determination depending on potential impacts, scale, and scope as described in the IG.
FWS	Migratory Bird Monitoring, Assessment and Conservation	\$6.3M	EA	Excluded	Research
FWS	Migratory Bird Conservation	\$56M	NR	Excluded	Land acquisitions and easements are Congressionally determined and not subject to the PR&G.
FWS	Migratory Bird Joint Ventures	\$13.1M	NR	Excluded	Funding program under threshold.
FWS	Cooperative Landscape Conservation	\$14.4M	NR	Excluded	Funding program under threshold.
FWS	Adaptive Science	\$10.8M	EIS	Excluded	Research
FWS	NFHS & FWCO O&M	\$16.1M	CE, EA, or EIS	Standard, scaled or excluded	Level of analysis depends on the potential impacts, scale, scope, and level of Federal investment; candidate for cumulative impacts analysis on a case-by-case determination.
FWS	National Fish Passage Program	\$8.9M	NR	Exempt	The projects, subject to FWS's Strategic Habitat Conservation model, must meet five program-specific criteria that are equivalent to the PR&G.
FWS	National Fish and Wildlife Foundation	\$7.0M	NR	Excluded	Under threshold.
FWS	Cooperative Recovery Initiative	\$5.9M	CE, EA, or EIS	Excluded	Individual projects are under threshold, and are diverse enough that cumulative effects do not exist.
FWS	Service-wide Construction Program	\$15.7M	CE, EA, or EIS	Excluded or scaled	Candidate for cumulative impacts analysis on a case-by-case determination depending on potential impacts, scale, and scope as described in the IG.

Bureau	Activity	Approx. Total Federal Investment Costs	Typical Level of NEPA Analysis	PR&G Analysis	Applicability/Reasoning
FWS	National Wildlife Refuge Fund	\$13.2M	NR	Excluded	Program is not related to water, and does not impact water resources.
FWS	Cooperative Endangered Species Conservation Fund	\$10.5M	NR	Excluded	Generally not water projects. Projects are diverse enough that cumulative effects analysis is not warranted, and individual projects are under threshold.
FWS	Recovery Land Acquisition Grants	\$9.5M	NR	Excluded	Individual grants are under threshold.
FWS	North American Wetlands Conservation Fund	\$34.1M	NR	Programmatic or excluded	Cumulative effects of restoration activities may warrant programmatic analysis. Land acquisition and easements are Congressionally determined and are not subject to PR&G have been determined to be excluded.
FWS	State Wildlife Formula Grants	\$49M	NR	Excluded or scaled	Generally under threshold; some projects may apply but Service has limited control over how funds are used.
FWS	State Wildlife Grants (Competitive)	\$5.5M	NR	Excluded	Under threshold; some projects may affect water, case-by-case.
FWS	Tribal Wildlife Grants (Competitive)	\$4M	NR	Excluded	Under threshold; some projects may affect water, case-by-case.
FWS	Coastal Wetlands Planning, Protection and Restoration Act (CWRRPA)	N/A	NR	Exempt	Multi-agency determination Equivalent Pathway.
FWS	Wildlife Restoration Program	\$785.9M	EA	Excluded	Formula grant to states, not water related.
FWS	Sport Fish Restoration Program	\$406.8M	NR	Excluded or Scaled	Projects are small, but program's cumulative effects may warrant a scaled and retrospective review on a programmatic basis.
FWS	Coastal Wetland Grants	\$14M	NR	Excluded	Under threshold.

Bureau	Activity	Approx. Total Federal Investment Costs	Typical Level of NEPA Analysis	PR&G Analysis	Applicability/Reasoning
NPS	Line Item construction	\$100 M/yr.; depends on prior year commitments and appropriations.	EA or EIS	Scaled	Analysis scaled based on thresholds; many projects are not water related.
OS	Indian Water Settlements	Varies	NR	Exempt	C&P provide an equivalent pathway.
OS	Land and Water Conservation Fund (NPS, FWS, BLM, and grants to states).	FY 12: DOI agencies \$147M; state grants \$45M	EA or EIS	Excluded, scaled, or programmatic	Can be land or easements; purpose of acquisitions varies, and could include recreation access, acquisitions within a refuge or park boundary, ESA, etc. State acquisitions have to be for the purposes defined in the LWCF Act. Typically not water related.
OS	Insular Affairs-Grant Programs	FY2013 - \$530M	CE, EA, or EIS	Scaled or excluded	New construction grant awards that exceed the \$50M threshold and affect water supply or water quality (e.g. invasive species control or support for shore-based resources) may undergo scaled analysis.
OS, BLM, NPS, FWS, BIA	Wildland Fire	Varies	EA/EIS	Exempt and Excluded	Emergency actions (firefighting) are excluded. Non-emergency actions (preparedness and fuels treatment) are exempt because they have an equivalent pathway (OWF risk-based analysis).
OS, NPS, FWS, BLM, BIA, Reclamation	Ecosystem restoration	Varies	CE, EA, or EIS	Excluded, scaled, standard or programmatic	Analysis excluded, scaled or standard based on project or program costs.
OS, FWS, NPS, BLM, BIA	Natural Resource Damage Assessment and Restoration and hazardous material response	Typically not Federal investments		Exempt and excluded	Equivalent pathways exist for the NRDAR process. Emergency actions related to hazardous material clean-up are excluded.
OS, FWS, NPS, BLM, BIA	Federal Lands Transportation Program	Typical project cost is about \$100k.	CE, EA, or EIS	Excluded	Projects below threshold, and many projects are O&M projects.

Bureau	Activity	Approx. Total Federal Investment Costs	Typical Level of NEPA Analysis	PR&G Analysis	Applicability/Reasoning
OSMRE	Abandoned Mine Land (SMCRA Title IV) grants to States and Tribes	FY 2011, grants to states and tribes ranged from \$258K to \$56M; the program total was \$320M. State and tribal project costs range from \$1000s to a few million	CE, EA, or EIS	Individual projects excluded; programmatic analysis could be considered	Project preauthorization decisions primarily reside with states and tribes; individual projects typically under threshold.
Reclamation	Feasibility Studies	Generally > \$20M	EIS	Standard	Project scope/complexity implies likely standard analysis.
Reclamation	Rural Water Feasibility Studies	Generally > \$20M	EIS	Standard	Project scope/complexity implies likely standard analysis.
Reclamation	Decommission/ Remove existing facilities	Generally > \$20M	EIS	Standard	Studies to decommission or remove existing dams would typically require the same level of analysis that is required for justifying construction of a facility.
Reclamation	Title XVI Projects	Max \$20M (typical project)	EA	Scaled	Scope/complexity of most projects implies a scaled analysis.
Reclamation	WaterSMART Grants	Annual Federal appropriations < \$50M/year.	Grant program	Excluded	Excluded based on funding levels of less than \$50 million/year.
Reclamation	Basin Studies	Studies typically cost < \$20M	NR until feasibility study.	Excluded	Basin Studies will typically be excluded from PR&G analysis because they are appraisal-level analyses at most, and do not recommend individual projects for authorization or construction.
Reclamation	Routine O&M	Varies	NR	Excluded	IG excludes O&M activities included in original project authorizations and consistent with authorizations.
Reclamation	Changes to project operations	Varies	EA, or EIS	Scaled	Depending on the magnitude of the change, could require a scaled analysis.
Reclamation	Extraordinary Maintenance	Varies	EA, or EIS	Excluded or scaled	Analysis excluded or scaled based on project cost and potential impacts. In some cases extraordinary maintenance may also be emergency maintenance.

Bureau	Activity	Approx. Total Federal Investment Costs	Typical Level of NEPA Analysis	PR&G Analysis	Applicability/Reasoning
Reclamation	Safety of Dams Projects	Typical project cost is > \$20M	EA	Excluded or scaled	Analysis scaled or excluded based on project cost. Instead of benefit-cost analysis, cost effectiveness / incremental cost analysis is primarily used.
Reclamation	Resource Management Plans	Varies, but typically under \$10M	CE, EA, or EIS	Scaled	Depends on scope and complexity.

Notes

^a The level of NEPA analysis listed in this column is intended only as an initial guide. The level of NEPA analysis listed for each activity does not necessarily apply to every situation. Level of NEPA analysis should be determined for each activity based on regulations, the project details, scoping, or other factors. NR = not required.

^b Bureaus and Offices have the discretion to conduct additional analysis using the PR&G framework, even if the activities/projects are identified as excluded or exempted in this table.

III. The Planning Process

A. Introduction

The DOI has developed the following planning process to implement the common framework summarized in the IG for analyzing Federal investments in applicable water resources. The planning process will ensure that plan formulation, evaluation, and implementation of agency projects and programs adequately incorporate the Guiding Principles identified in the Principles and Requirements. DOI's planning process consists of a series of steps that identifies or responds to problems and opportunities associated with the Federal Objective, as well as specific state and local concerns, and culminates in the selection of a recommended plan. The process involves an orderly and systematic approach to making determinations and decisions at each step so that the interested public and decision makers in the planning organization can be fully aware of: the basic assumptions employed; the data and information analyzed; the areas of risk and uncertainty; the reasons and rationales used; and the significant implications of each alternative plan. Some bureaus have well established planning processes that could be used in the course of undertaking a PR&G analysis.

The PR&G require the use of an ecosystem services framework. Existing scoping processes may need to be adjusted to accommodate this framework. Such adjustments could include explicit identification of desired environmental conditions.

B. Scope -- Identify Problems, Needs, and Opportunities

This step corresponds to the NEPA requirement to define the purpose and need. If an EIS is required, a Notice of Intent will be issued and initial scoping occurs. In addition to NEPA, the requirements of the PR&G, scoping should:

1. Ensure that the planning goals and objectives reflect the direction provided in the authorizing legislation,
2. Clearly identify the purpose of the study, the role of the Federal government, as well as the views of the study team, the study cost-share partner (if any), cooperating agencies, various stakeholders, and the public;
3. Identify the problems and opportunities to which the agency is responding;
4. Define the study area, and describe the affected stakeholders' involvement; and
5. Prepare a brief summary of the planning objectives, and constraints to be used in the analysis of the federal investment. This summary should include a discussion of stakeholder, partner, and public input.

Specific problems, opportunities, and significant constraints within the study area should be identified, planning goals and objectives consistent with the objectives of the PR&G should be established,

consistent with the objectives of the PR&G. Scoping can also include a discussion of the social and cultural context of the region and resources.

C. Inventory Existing Resources and Forecast Future Conditions

This step corresponds to the NEPA requirement to identify the affected environment. A summary of the specific economic, environmental, and social setting within the study area should cover the condition and functional relationships of affected resources; their development potentials and possible conflicts in producing affected ecosystem services; and the local situation with respect to investment, climate, markets, and basic economic productivity.

“Forecast Future Conditions” generally relates to the NEPA requirement to identify impacts associated with the alternatives, including the No Action Alternative. This exercise of identifying existing resources and forecasting future conditions will quantify relevant water and related resource conditions as they currently exist within the study area and forecast future conditions over the period of analysis.⁵ This step confirms the problems, needs, and opportunities that need to be addressed in the subsequent steps. The inventory and forecast will provide information for understanding existing conditions and establishing a baseline for forecasting with- and without-plan conditions. The inventory used to describe existing conditions and to provide a baseline for forecasting future with-and-without plan conditions will also be used to verify that the problems and opportunities initially identified are relevant to the water and related resources of the study area.

1. Without-project condition. The without-project condition is the most likely condition expected to exist in the future over the period of analysis in the absence of the project or program under consideration given current laws, policies, projects under construction or authorized, and any existing resources/conditions. It corresponds with the NEPA requirement to identify a “No Action” alternative in an EIS.⁶ It includes actions that may be expected by others.
2. With-project condition. The with-project condition is the most likely condition expected to exist in the future, over the period of analysis, with a specific Federal project or program in place.
3. The existing and future conditions baselines will be established using peer-reviewed (if possible) and generally accepted projections of income, employment, output, and population that are national, state, or regional in scope.
4. The potential impacts of climate change should be considered when developing projections of environmental conditions, water supply and demand, and operational conditions at

⁵ Generally, the length of period of analysis should be consistent with the anticipated life of an investment.

⁶ When the Responsible Official determines that there are no unresolved conflicts about the proposed action with respect to alternative uses of available resources, the environmental assessment (EA) need only consider the proposed action and does not need to consider additional alternatives, including the no action alternative (42 CFR 46.310(b)).

existing facilities as part of both the with-and-without plan future conditions. Climate change impacts should be further analyzed, as appropriate, as part of the analysis when the following conditions are true:

- a) There is a reasonable likelihood of considerable variation in hydro-climatic conditions over the period of analysis, between alternatives, or both; and
 - b) Available regional models have been down-scaled to a resolution adequate for the study area, or can be produced within reasonable time and cost constraints.
5. To ensure that the appropriate criteria and problems are incorporated into the analytical framework, a brief summary of the process used to define the relevant existing conditions and reasonably foreseeable future conditions should be prepared. This should include discussion of stakeholder, partner, and public inputs.

D. Formulate Alternative Plans

The primary function of an alternative must be to alleviate unsatisfactory conditions or satisfy a need that exists or will exist in the future without the programs or projects under consideration. Alternative plan formulations should focus on solutions that are practicable, feasible, and meet the planning objectives. Alternatives are to be formulated in a systematic manner. A range of potential plans should be initially investigated, and as those plans are refined, some should be eliminated. The study report should include some analysis of the eliminated alternatives, and reasons for their elimination. The plans that are retained for additional analysis are termed the “analyzed alternatives.” The analyzed alternatives developed at this stage should determine the range of reasonable alternatives, as required for the NEPA analysis.

1. Alternative plans should clearly identify and evaluate the tradeoffs among stakeholders and resources. The viability of an alternative should be determined through an evaluation of its acceptability, efficiency, effectiveness, and completeness, as required in the PR&G.⁷ Note that the previous Principles and Guidelines also directed that alternative plans be formulated based on these same criteria. Alternative plans should be formulated to meet planning objectives based on most likely future conditions expected with and without implementation of a plan.

⁷ As defined in the P&R Glossary (p. 15): **Completeness** is the extent to which an alternative provides and accounts for all features, investments, and/or other actions necessary to realize the planned effects, including any necessary actions by others. It does not necessarily mean that alternative actions need to be large in scope or scale; **Effectiveness** is the extent to which an alternative alleviates the specified problems and achieves the specified opportunities; **Efficiency** is the extent to which an alternative alleviates the specified problems and realizes the specified opportunities at the least cost; and **Acceptability** is the viability and appropriateness of an alternative from the perspective of the Nation’s general public and consistency with existing Federal laws, authorities, and public policies. It does not include local or regional preferences for particular solutions or political expediency. These definitions are very similar to the definitions contained in the P&Gs.

2. Consideration of nonstructural alternative actions or plans that meet the planning objectives should be an integral part in the evaluation of Federal investments in water resources.
3. Each alternative plan formulated for the PR&G analysis should be included in the NEPA document, or if there are any differences in the array of alternatives between the PR&G analysis and NEPA document, those differences should be explained and justified. The period of analysis should be the same for each alternative plan. Documentation of the rationale for eliminating any alternative plan should be provided.
4. Investigations, data collection, and analysis should be ongoing and integrated early in the planning process. Investigations should be relevant to the planning objectives and constraints. The interdisciplinary study team should consider the following areas for investigation: engineering and design; surface water and groundwater hydrology; hydraulics; geology; operations; water quality; land resources and irrigability; power generation and conservation; economics; financing; environmental, social, and cultural impacts and mitigation; opportunities for recreation; and cost estimation for construction, operation, maintenance, replacement, and energy consumption. Additional investigations should be performed as necessary.

E. Considerations for Developing and Evaluating Alternatives

1. Introduction

Alternatives should be developed that: 1) address the defined water resource challenge or function that is the subject of the analysis, and 2) achieve multiple objectives as outlined in the P&R. At a minimum, a without- and a with-project alternative should be evaluated and compared for a specified period of time into the future. More often, it is appropriate to evaluate and compare a full range of alternatives.

Analysis to support the water resources alternatives should utilize the best available science, data, analytical techniques, procedures, models, and tools in ecology, hydrology, economics, engineering, biology, and other disciplines to the extent that sufficient funding is available. To the extent feasible, the effects of the alternatives should be quantified. Established tools may be appropriate to use for quantification as use of those tools can promote consistency and comparability among projects, but new and evolving tools and methods may also be necessary to use in analyses in order to fully inform the decision making process.

The level of detail required to support alternative analyses may vary, but should be sufficient to inform the decision making process efficiently and effectively. The level of detail, scope, and complexity of analyses should be commensurate with the scale, impacts, costs, scientific complexities, uncertainties, risk, and other aspects (e. g. public concern) inherent in potential decisions.

Future land use patterns should be assessed and analyzed as part of the evaluation process and the best available data and forecast should be used to complete an analysis of these uncertain conditions.

Future land use patterns should be evaluated based on historical trends and projections. An assessment

of any approved local master plan or other land use plans that guide management, conservation, population growth and development should be included in the evaluation in order to promote full disclosure of effects.

Adaptive management is a deliberate, iterative and science-based process of designing, implementing, monitoring and adjusting an action or project component to reduce uncertainty and maximize achievement of project goals.⁸ Adaptive management should be evaluated and incorporated into alternatives where warranted to avoid and minimize adverse impacts on the environment. Adaptive management measures should be clearly identified and evaluated as part of alternatives in order to further reduce uncertainty particularly when more detailed information concerning the alternative is lacking. Adaptive management approaches should be used to the extent that implementing such approaches is commensurate with the significance of the proposed activity and available resources.

2. Collaboration

Agencies should seek to collaborate “fully” with Federal and non-Federal entities; the method and scope of the collaborative effort should be driven by the nature of the activity, issues, and likely solutions.

3. Risk and Uncertainty

Planning should identify, describe, and consider areas of risk and uncertainty. Risks and uncertainties should be identified and described in a manner that is clear and understandable to the public and decision makers. This includes describing the nature, likelihood, and magnitude of risks (including quantitatively where feasible), as well as the uncertainties associated with key supporting data, projections, and evaluations of competing alternatives. Climate change, future land use, and adaptive management can all be considered in the context of analyzing risk and uncertainty. An analysis of risks and uncertainties should describe the nature, likelihood and magnitude of risks and uncertainties associated with the project alternative or activity, including quantitative information where feasible. A useful definition of “risk” for planning purposes is the likelihood of a specific magnitude of a harmful outcome occurring in the future. For example, the statement, “There is a 10 percent likelihood of zero water deliveries next month,” identifies the risk of not receiving water in a specific timeframe. It explains the likelihood (10 percent) of a specific magnitude (zero deliveries) of a harmful outcome (lack of water deliveries) at a specific time in the future (next month). “Uncertainty” is used to express doubt or lack of knowledge about a positive (beneficial) or negative (harmful) outcome. Uncertainty may be expressed either qualitatively or quantitatively. In the example above, uncertainty can be identified as the 10 percent likelihood, or even as a level of confidence about the entire prediction.

When there are considerable uncertainties concerning the ability of an alternative to function as desired (e.g., produce desired outputs, and/or the general acceptability of the alternative) the option of pursuing improved data or models should be considered. Reducing risk and uncertainty may involve

⁸ U.S. Department of the Interior. 2007, Adaptive Management: The U.S. Department of the Interior Technical Guide. (<http://www.doi.gov/initiatives/AdaptiveManagement/TechGuide.pdf>).

increased costs or loss of benefits. The advantages and costs of reducing risk and uncertainty should be explicitly considered in formulating alternatives and the overall decision making process.

When analyzing potential Federal water resource investments, areas of risk and uncertainty should be identified, described, quantified where possible, and considered as part of the decision. The first step to evaluate risk and uncertainty is to identify the nature of the harmful outcomes. The second step is to identify the likelihood of the outcome, either qualitatively or quantitatively. The third step is to identify a specific magnitude of the negative outcome relative to the proposed project objectives.

4. Climate Change

Conditions resulting from a changing climate should be identified and accounted for in the planning process; uncertainties associated with climate change should be identified, described, and quantified where possible. This includes addressing the extent to which varying degrees of uncertainty are associated with climate change impacts on water resources. Analysis of climate change impacts should be informed by both historical records and models of projected future impacts of an altered climate on water resources.

5. State Water Law

State water laws, water rights, decrees, and Indian treaties should be recognized and complied with in the planning process.

6. Watershed Approach

When developing alternatives, the water resource challenge or function being addressed should be analyzed on a watershed level to facilitate inclusion of a complete range of solutions that achieve multiple objectives. The watershed approach allows for consideration of upstream and downstream conditions and needs, as well as a means to more thoroughly address the potential impacts of a proposed action. The scale and scope of the watershed used to develop alternatives can vary. The watershed used to develop alternatives should encompass a geographical area large enough to ensure plans address cause and effect relationships among affected resources and activities, both upstream and downstream that are important to gaining public benefits from the project.

7. Floodplains

Floodplains connect land and water ecosystems and support high levels of biodiversity and productivity. The Federal Flood Risk Standard requires all future Federal investments in and affecting floodplains to meet the level of resilience as established by the standard set in Executive Order 13690, *Establishing a Federal Flood Risk Management Standard and a Process for Further Soliciting and Considering Stakeholder Input*.

Alternatives should be developed that avoid the unwise use of floodplains and/or flood-prone areas. If the areas cannot be avoided then the alternatives should address how adverse impacts to these areas can be minimized. For more information, go to:

- <http://www.archives.gov/federal-register/codification/executive-order/11988.html>
- http://floodplain.org/For_Immediate_ReleaseJanuary_30.pdf

8. Resilient Ecosystems

When possible, alternatives should be developed to avoid the risk of adverse environmental impacts. When the risk of adverse environmental impacts cannot be completely avoided, alternatives should be developed to minimize environmental impacts. When a particular alternative will cause unavoidable damage to the environment, mitigation to offset damages should be incorporated into that alternative and evaluated as part of that alternative. In developing alternatives, consideration should be given to ecosystem resilience, the capacity of an ecosystem to respond to a perturbation or disturbance by resisting damage and recovering quickly. Resilience can be maintained or even increased by altering the magnitude, frequency and duration of disturbances, allowing ecosystems to better respond to external influences over time. The concept of resilience is useful to understanding and improving the management of ecosystems.

9. Water Quality

The effect of Federal investments on water quality should be considered and evaluated for all alternative plans or actions.

10. Water Use

Water supplies will continue to be subject to variability in precipitation and runoff and subject to the uncertain effects of a changing climate. Water availability and efficient use of water should be considered in alternative designs. Alternatives should first consider opportunities to improve water efficiency with respect to existing water infrastructure and supplies. When efficiency alone is not practicable, the reuse and reclamation of water should be promoted and evaluated. The alternatives should also address the sustainable use and management of water resources that improves or maintains water quality.

11. Nonstructural Approaches

Nonstructural alternatives include but are not limited to modification of public policy, regulatory policy, and pricing policy, as well as best management practices including utilization of green infrastructure. Nonstructural measures may be combined with fewer or smaller traditional structural project components to produce a complete alternative plan. Full consideration and reporting on nonstructural alternative actions should be an integral part of the evaluation of Federal water resource investment alternatives.

12. International Concerns

Alternatives for water resource investments must be consistent with meeting treaty and other international obligations. Analyses should identify international obligation constraints that preclude selection of an otherwise viable alternative.

13. Public Safety

Alternative solutions should avoid, reduce, or mitigate risks to public safety and include measures to manage and communicate residual risks. The impact and reliability of alternatives on threats to public safety must be evaluated and documented.

14. Timing

Generally, the period of analysis for alternatives should be consistent with the life of the Federal investment. For many water resource capital investments this could be 100 years. The time period selected should be documented clearly and with the appropriate justification in the analysis, and used to evaluate each alternative.

15. Environmental Justice

Environmental Justice refers to the fair treatment and meaningful involvement of all people regardless of race, color, national origin, culture, education, or income with respect to the development, implementation, and enforcement of environmental laws, regulations, and policies. Any disproportionately high and adverse public safety, human health, or environmental burdens of project alternatives on minority, tribal or low-income populations should be avoided. Information on DOI's Environmental Justice Strategic Plan, guidance, progress reports, and training are available at: <http://www.doi.gov/pmb/oepe/environmental-justice.cfm>. Guidance and useful information on addressing environmental justice considerations can be found in the 2011 interdepartmental Memorandum of Understanding (MOU) on Environmental Justice and Executive Order 12898: <http://www.epa.gov/environmentaljustice/resources/publications/interagency/ej-mou-2011-08.pdf>.

F. Final Array of Alternatives

1. General Components of Analysis of Final Array of Alternatives

In order to support full disclosure and promote transparency in the decision making process, the analysis of the final array of alternatives should include, at a minimum, the following:

- A discussion of: the primary purpose of the analysis; the geographic size of the study area; number of people potentially affected and anticipated degree of impact; the type of impacts; environmental justice considerations; and the size and location of communities potentially affected including the presence of Federally recognized tribes or tribal members; and the type of data and information available from collaboration, public involvement, and previous studies, if any.
- A without and a with-project alternative.
- Changes in existing statutes, implementation authority, administrative regulations, and/or law or policies that affect the alternatives should be identified.

- Alternatives that can effectively address a problem through the use of nonstructural approaches, if they exist, must be fully considered and included in the final array of alternatives. Such alternatives must be given full and equal consideration in the decision making process.
- Identification of an alternative that maximizes net public benefits.
- Identification of an alternative that is preferred by a local interest with oversight or implementation responsibilities must be included in the analysis.
- Mitigation of unavoidable adverse effects associated with each alternative must be included in the alternative and analyses.

Recommendations for Federal investments in water resources to address identified water resources needs must be justified by the value of public benefits as compared to costs. The basis for selection of the recommended plan should be fully reported and documented, including the criteria and considerations used in the selection of the recommended course of action by the Federal Government.

G. Evaluate Effects of Alternative Plans

Chapter Three of the IG includes requirements for evaluating the final array of alternatives selected. The present value cost of each alternative must be compared to the present value of the benefit to the public, and each alternative's performance in regard to the Guiding Principles must be assessed. The beneficial and adverse effects of each alternative plan should be evaluated through comparison to the without-plan scenario in accordance with the PR&G. The evaluation of alternatives is part of the NEPA alternatives analysis, in which the No Action Alternative and Action Alternatives are described, evaluated, and compared.⁹ The effects of alternative plans are displayed in terms of public costs and benefits.

H. Compare Alternative Plans

Alternative plans should be compared to each other and to the without-plan scenario and should compare the ability of the alternative plans to respond to changing conditions, including climate change. The comparison of alternatives is part of the NEPA alternatives analysis. The plan that reasonably maximizes net public benefits should be identified.

I. Select the Recommended Plan

The agency should recommend a decision to either: 1) implement an alternative project or program, or 2) take no Federal action. If the agency recommends no Federal action, then NEPA analysis is not required. The recommended plan must maximize net public benefits. Public benefits encompass environmental, economic, and social goals, include monetary and non-monetary effects and allow for the consideration of both quantified and unquantified measures.

⁹ Technically, a no-action alternative is not required by NEPA for an EA (43 CFR 46.310), but it is common practice to include it for comparison purposes.

IV. NEPA

A. Introduction

The National Environmental Policy Act of 1969 (NEPA) requires Federal agencies to consider and disclose to the public the environmental effects of a proposed Federal action and alternatives before making a decision or taking action. The PR&G acknowledges that many Federal investments in water resources through projects, programs, or activities require analysis under NEPA. An agency's ASP for implementing the PR&G will "complement its existing NEPA processes, although the analyses conducted under NEPA and the PR&G processes may not always overlap" (IG, p. 8). The PR&G highlight the usefulness of integrating the planning and NEPA compliance processes. See Section IV for additional details.

This section of the DOI Guidance: summarizes the connections between the PR&G and NEPA; highlights common aspects of PR&G and NEPA analyses and the importance of consistency; and discusses the analytical requirements of the PR&G that differ from those normally completed under NEPA. Finally, this section includes suggestions for incorporating a PR&G analysis into your agency's NEPA practice.

Where Federal investments in water resources require analysis under NEPA and the PR&G, agencies "should integrate, to the extent possible, their PR&G analysis into existing planning processes, in the same way the NEPA process and land management planning are integrated into larger planning processes" (IG, p. 8). Agencies may "integrate the PR&G and NEPA analyses by producing an analytical document that reflects both analytic processes, if that is the most efficient method for fulfilling NEPA and the PR&G" (IG, p. 8). The PR&G suggest that agencies "facilitate the production of a single recommendation and/or decision document that fulfills the requirements of both processes" (P&R, p. 6). *Note that NEPA may be a component addressed during a planning process but is not a substitute for project planning.*

In addition, bureaus and offices should seek opportunities to integrate other Federal and state environmental reviews with their NEPA and PR&G analyses. For instance, the Council on Environmental Quality (CEQ) and the Advisory Council on Historic Preservation (ACHP) published NEPA and NHPA: A Handbook for Integrating NEPA and Section 106 (Mar. 2013). The CEQ and the California Governor's Office of Planning and Research (OPR) prepared a handbook on integrating NEPA and California Environmental Quality Act (CEQA) reviews, NEPA and CEQA: Integrating Federal and State Environmental Reviews (Feb. 2014). Both handbooks are available at: <https://www.whitehouse.gov/administration/eop/ceq/initiatives/nepa/handbooks> These examples of guidance for integrating NEPA and other reviews may help bureaus realize efficiencies when applying the PR&G to projects that are subject to multiple reviews.

While this section focuses on integrating NEPA and PR&G analysis, it is important to remember that PR&G applicability and NEPA compliance are based on different criteria. This means that if a proposed activity, program or grant is described as exempt from the PR&G, NEPA compliance still may be

required. Conversely, a proposed activity, program or grant for which NEPA analysis is already complete (e.g., because a bureau or office can tier to an existing NEPA document) may still require a PR&G analysis.

B. NEPA and the PR&G

The procedural requirements of NEPA found in Council on Environmental Quality (CEQ) (40 CFR Parts 1500-1508) and DOI (43 CFR Part 46) regulations apply to each bureau/office proposed action that 1) would cause effects on the human environment and 2) is subject to bureau control or responsibility, considering the need for Federal funding or approval (43 CFR § 46.100). For each such proposed action, the lead agency under NEPA typically prepares an environmental impact statement (EIS) or an environmental assessment (EA) that analyzes the direct, indirect, and cumulative effects of the proposed action and alternatives, as applicable, including mitigation, on the human environment; or determines that the action can be categorically excluded from further analysis under NEPA. The NEPA document informs the bureau's decision, which is grounded in relevant legal authorities (e.g., the Federal Land Policy and Management Act or the Endangered Species Act) and policy objectives and is memorialized in a decision document.

The PR&G apply to a subset of the Federal proposed actions that are subject to NEPA, those "Federal investments that by purpose, either directly or indirectly, affect water quality or water quantity, including ecosystem restoration or land management activities" (P&R, p. 1). The IG and DOI ASP refine the applicability of the P&R (see Table 2, DOI Programs – Level of PR&G Analysis). Moreover, PR&G analysis is more focused than NEPA analysis, although the analyses overlap. The PR&G analysis under the DOI ASP is based on the Federal Objective, Guiding Principles, and General Requirements of the PR&G (IG, p. 3) as described elsewhere in this document.

To encourage efficiencies and foster understanding, bureaus and offices generally should integrate PR&G analysis into NEPA analysis for a proposed action by presenting the PR&G analysis in the NEPA document.¹⁰ For most proposed actions, the EA or EIS should include a description of each step of the PR&G analysis and clear explanations of any requirements, considerations, and choices that are specific

¹⁰ The IG states that while the PR&G do "...not substitute or supersede any NEPA requirements or any other planning requirements," integrating PR&G analysis into existing project planning "reduces the risk of duplicative analyses." Moreover, "[a] single analytical document could help ensure consistency across the alternatives analyzed and the other components common to the two processes, as well as reduce the workload for reviewers" (IG, p. 8). Such integration is consistent with CEQ NEPA regulations directing Federal agencies, "to the fullest extent possible," to "[i]ntegrate the requirements of NEPA with other planning and environmental review procedures required by law or by agency practice so that all such procedures run concurrently rather than consecutively." 40 CFR§1500.2(c), *see also* 40 CFR§1500.4(k) and 1500.5(g) (directing agencies to reduce paperwork and delay by "[i]ntegrating NEPA requirements with other environmental review and consultation requirements" and citing section 1502.25); 40 CFR§1501.2 (directing agencies to "integrate the NEPA process with other planning at the earliest possible time to insure that planning and decisions reflect environmental values, to avoid delays later in the process, and to head off potential conflicts") and 40 CFR§1506.4 (providing that "[a]ny environmental document in compliance with NEPA may be combined with any other agency document to reduce duplication and paperwork").

to the PR&G (i.e., not otherwise required under NEPA). Some examples of such requirements, considerations, and choices are described in the “Analytic Requirements Specific to PR&G Analysis” section below. For proposed actions for which new NEPA analysis is not necessary (e.g., where a bureau can comply with NEPA by referencing or tiering an existing NEPA document), bureaus may present the PR&G analysis in a stand-alone document. Upon completing the required NEPA and PR&G analyses, bureaus should describe the resulting decisions and outcomes, including any mitigation commitments, in a single decision document (e.g., a Record of Decision following an EIS).

C. Consistency in PR&G and NEPA Analyses

Several aspects of a PR&G analysis are consistent with aspects of NEPA analysis. For instance, the ecosystem service approach as described in Section VI is consistent with and may inform NEPA analysis. One of the purposes of NEPA itself is to “encourage productive and enjoyable harmony” between people and their environment (42 USC 4321; see 42 USC 4331(a)), and NEPA affirms the Federal Government’s responsibility to “use all practicable means, consistent with other essential considerations of national policy, to improve and coordinate Federal plans, functions, programs, and resources” in order for the Nation to “attain[ing] the widest range of beneficial uses of the environment without degradation, risk to health or safety, or other undesirable and unintended consequences” (42 USC 4331(b)(3)).

In addition, agencies may consider benefit-cost analysis under NEPA in certain circumstances. The NEPA does not require agencies to use a monetary benefit-cost analysis when comparing alternatives, and such analysis “should not be [used] when there are important qualitative considerations” (40 CFR § 1502.23). Yet, NEPA allows agencies to consider a benefit-cost analysis “relevant to the choice among environmentally different alternatives [that] is being considered for the proposed action,” provided the EIS incorporates by reference or appends the analysis and discusses its relationship to “any analyses of unquantified environmental impacts, values, and amenities” (40 CFR § 1502.23). Thus, a PR&G analysis can build on bureaus’ and offices’ consideration of social and economic effects under NEPA (40 CFR §§ 1508.8 and 1508.14) and incorporate appropriate benefit-cost analysis.

The guiding principles and general requirements of the PR&G also align with considerations under NEPA. For instance, the P&R indicate that agencies should “provide opportunities for effective public participation by minority, tribal, and low-income communities in Federal planning and decision making processes,” including by “identifying potential effects and mitigation measures in consultation with affected communities...” (P&R, p. 5). The NEPA analysis includes such analysis and mitigation of effects related to environmental justice where relevant. In addition, the PR&G require that agencies identify, describe, and consider areas of risk and uncertainty for potential investments in water resources, including climate change (P&R, Chapter II, § 1.D.i., pp. 9-10). The NEPA analysis encompasses the potential effects of a proposed action and alternatives related to climate change, as indicated by its greenhouse gas (GHG) emissions, as well as the implications of climate change for the environmental

effects of a proposed action and alternatives, where relevant.¹¹ Bureaus generally should discuss common requirements of the PR&G and NEPA together in one or more sections of a NEPA document. (Section E below provides suggestions for doing so.) In doing so, bureaus should explain any differences in focus or outcomes of the PR&G and NEPA analyses.

Where the requirements of PR&G and NEPA analyses overlap assumptions, alternatives, and baseline conditions should be consistent between the two analyses. Consistency will facilitate efficiency and public involvement in the PR&G and NEPA processes, and it will help to ensure that bureau decision makers receive a coherent analysis that informs a single, integrated decision document. If consistency is not feasible or appropriate for every aspect of the PR&G and NEPA analyses, the NEPA document should explain the need for and value of any assumptions, alternatives, or baseline conditions used in the PR&G analysis that differ from those used in the NEPA analysis.

D. Analytic Requirements Specific to a PR&G Analysis Not Addressed in NEPA

The PR&G and the IG contain several specific requirements for PR&G analysis that are not included in the requirements of NEPA and the CEQ and DOI NEPA implementing regulations. Table 3 summarizes some of the key distinctions.

When preparing a NEPA document (or a separate PR&G document if no new NEPA document needs to be prepared), bureaus should indicate which analytical requirements or discussions are specific to the PR&G analysis. The explanation will help the public and decision-makers to use the NEPA analyses to inform the resulting decisions. In particular, bureaus should identify the following analytical requirements specific to the PR&G where they are relevant.

- **Federal Objective.** Under the PR&G, Federal investments are evaluated with respect to the Federal Objective and should promote the guiding principles: Healthy and Resilient Ecosystems; Sustainable Economic Development; Floodplains; Public Safety; Environmental Justice; and Watershed Approach (PR&G, Chapter I, sections 2-3 (p. 3-4). By contrast, under NEPA, the PR&G objectives and guiding principles are not already incorporated into the purpose and need. A lead agency's purpose and need for the proposed action (40 CFR § 1502.13) frames the analysis, and it is grounded in other statutory authorities (e.g., the Federal Land Management Policy and Management Act (FLPMA)).
- **Alternatives.** The requirements for analyzing alternatives under the PR&G differ from the requirements for analyzing alternatives under NEPA, although both authorities ask agencies to consider a reasonable range of alternatives (P&R, p. 12; IG, p. 20). The alternatives analyzed under NEPA, which must meet the purpose and need for the proposed action (43 CFR § 46.100)

¹¹ See CEQ, *Revised Draft Guidance for Federal Departments and Agencies on Consideration of Greenhouse Gas Emissions and the Effects of Climate Change in NEPA Reviews*, 79 Fed. Reg. 77802, 77823 (Dec. 24, 2014).

and reflect underlying legal authorities and policy objectives, likely will be similar to those analyzed under the PR&G for proposed actions that focus on water resources.¹²

The PR&G and the IG also contain specific requirements for analyzing alternatives, in contrast to the more general NEPA requirement that a lead agency consider a reasonable range of alternatives (see 40 CFR§1502.14). Unique requirements of the PR&G include “full consideration and reporting on nonstructural alternative actions or plans” (PR&G, Chapter II, Section 1.F., p. 11) and a specific, final array of alternatives (PR&G, Chapter II, Section 1.H., p. 12). The IG (Chapter III, Section 7.a.iv., p. 20) explain that “[a]lternatives should comprehensively integrate multiple objectives for water resources investments” and “...should reflect a range of scales and management measures, and be assessed against the formulation criteria” in the PR&G: completeness, effectiveness, efficiency, and acceptability. This is generally very similar to what is required under NEPA.

The PR&G also call for a transparent comparison of the effects of alternatives for their contribution to the Federal Objective and each of the Guiding Principles, using an ecosystem service approach and including a discussion of trade-offs in documentation provided in display and narrative form (see IG, Chapter III, Sections 7.a.v and 7.a.vi, pp.21-24). While an ecosystem service approach may be used in NEPA analysis, NEPA does not require this explicit comparison.

Table 3

Comparison of PR&G and NEPA Analysis

Issue	PR&G	NEPA
Federal objective	Should promote the guiding principles: Healthy and Resilient Ecosystems; Sustainable Economic Development; Floodplains; Public Safety; Environmental Justice; and Watershed Approach	A lead agency’s purpose and need for the proposed action frames the analysis, and is grounded in other statutory authorities (e.g., the Federal Land Management Policy and Management Act)
Range of alternatives	NEPA alternatives should differ from the PR&G alternatives only for proposed actions with a different purpose and need, where water resources are a minor consideration.	Alternatives must meet the purpose and need for the proposed action.
Project formulation criteria	Completeness, effectiveness, efficiency, and acceptability	NEPA criteria are generally similar.
Ecosystem service framework	Required	Not required, but may be used.

¹² NEPA alternatives should differ from the PR&G alternatives only for proposed actions with a different purpose and need, where water resources are a minor consideration. In such situations, the proposed action likely would be eligible for scaled PR&G analysis (see Table 1., Financial Thresholds) or excluded from PR&G analysis altogether.

E. NEPA Practice

To most fully integrate the PR&G and NEPA processes at the earliest stages, bureaus should describe and request public input on the PR&G analysis in the Notice of Intent to prepare an EIS (43 CFR § 46.435(a)). Bureaus also shall use the NEPA scoping process to inform state, local, and tribal governments and the public of the need for a PR&G analysis, where applicable, and to learn of any information or concerns relevant to the analysis.

Bureaus should also describe and request public input on the PR&G analysis in the Notice of Intent to prepare an EIS (43 CFR§ 46.435(a)). Bureaus also should consider using the NEPA scoping process to inform state, local, and tribal governments and the public of the need for PR&G analysis, where applicable, and to learn of any information or concerns relevant to the analysis.

Bureaus should consider engaging other government agencies, including NEPA cooperating agencies, on PR&G analyses. Collaboration is one of the general requirements of the PR&G, which call on Federal agencies to “collaborate fully on water resources related activities with other affected Federal agencies and with tribal, regional, state, local, and non-governmental entities,” as well as other groups (PR&G, Chapter II, Section 1.C, p. 8). The DOI NEPA regulations require that bureaus “whenever possible consult, coordinate, and cooperate with relevant state, local, and tribal governments and other bureaus and Federal agencies concerning the environmental effects of any Federal action within the jurisdictions or related to the interests of these entities” (43 CFR§ 46.155). This is one avenue for collaboration on PR&G analyses.

In addition, bureaus are required to invite eligible cooperating agencies, those Federal, state, tribal, or local agencies with jurisdiction by law or special expertise (see 43 CFR § 46.225(a)), to serve as cooperating agencies in the preparation of a NEPA document. Like NEPA analysis, a PR&G analysis that is integrated into the NEPA process could benefit from lead agency-cooperating agency relationships. While cooperating agency status is not available to all stakeholders, it offers another avenue for bureaus to collaborate with eligible and willing Federal agencies or state, tribal, or local governments on a PR&G analysis through the NEPA process. If more than one Federal bureau or agency is involved, the lead bureau’s or agency’s ASP will guide the analysis.

To facilitate integration of PR&G analysis into NEPA analysis, bureaus should alert direct or third-party contractors preparing NEPA documents to the requirements for a PR&G analysis. Bureaus also may need to include elements of PR&G analysis in statements of work. Contractor awareness will facilitate the timely and efficient integration of PR&G analysis into NEPA and decision documents.

Finally, bureaus should document their PR&G and NEPA analyses throughout the NEPA process and include the relevant documentation in the administrative record.¹³ These practices will support the preparation of sound documents that integrate PR&G and NEPA analyses.

¹³ All documents related to the agency's decision-making process and the basis for the agency's decision.

V. Existing Guidance

Existing bureau and office guidance should form the basis for the analysis done to satisfy the requirements of the PR&G. In some cases, bureaus may wish to develop more specific guidance.

Guidance that might be of interest to all bureaus includes the following:

- BLM Instruction Memorandum (IM) No. 2013-131, *Guidance on Estimating Nonmarket Environmental Values*
Values: http://www.blm.gov/pgdata/etc/medialib/blm/wo/Information_Resources_Management/policy/im_attachments/2010.Par.49792.File.dat/IM2010-061_att1.pdf
This guidance directs BLM staff to utilize estimates of nonmarket environmental values in NEPA analysis supporting planning and other decision-making where relevant and feasible. The Guidance calls for at least a qualitative description of the most relevant nonmarket values to be included for the affected environment and the impacts of alternatives in NEPA analyses involving environmental impact statements (EIS), for both resource plans and project-level decisions.
A quantitative analysis of nonmarket values in EIS-level NEPA analyses is strongly encouraged where one or more of the criteria identified in the IM apply.
- Reclamation has existing guidance in the Reclamation Manual Directives and Standards CMP 09-02, *Water and Related Resources Feasibility Studies*, available at: <http://www.usbr.gov/recman/cmp/cmp09-02.pdf>
- DOI also has existing guidance on issues associated with environmental justice. A collection of resource materials is available at: <http://www.doi.gov/pmb/oepec/environmental-justice.cfm>

VI. Ecosystem Services

A. Introduction

Interest in incorporating ecosystem services into Federal decision making is growing. The Executive Offices of the President has committed to issue new guidance related to Federal decision making and ecosystem services.

DOI bureaus and offices apply ecosystem services analyses and conduct research on ecosystem services in cooperation with other Federal and university partners on local, regional and national scales. Reclamation uses ecosystem services to evaluate the benefits and costs of water projects; the Office of Restoration and Damage Assessment uses ecosystem services in evaluating resource related losses and determining restoration to compensate the public for resource-related losses; FWS incorporates ecosystem services valuations into its regulatory programs and program reviews; the Bureau of Land Management is pilot testing ecosystem services valuation tools to improve resource program planning and management; and the Office of Wildland Fire incorporates ecosystem services into its models to improve fire managers' and analysts' response to fire incidents. A compilation of DOI examples that

have applied the ecosystem service framework is found in Appendix A. An illustrative set of ecosystem services and associated benefits is found in Appendix B.

The PR&G require an analysis of water projects in terms of the expected change in ecosystem service flows over time. Ecosystem goods and services are those things provided by nature that are of use to humans. While a distinction is sometimes made between ecosystem goods (tangible commodities produced by nature, e.g., timber production) and ecosystem services (less tangible benefits of well-functioning natural systems, e.g., wetland water quality), often the phrase ecosystem services refers collectively to all of these benefits. At the root of the ecosystem service concept is the connection between the biophysical elements of an ecosystem and the health and well-being of the human populations that depend on that ecosystem. Ecosystem services can be described as the elements that make explicit this connection, as they are dependent on the structure and processes of the ecosystem, but directly benefit humans.

The ecosystem service concept provides an analytical framework which can be commonly used across agencies, fully articulates the tradeoffs inherent in a decision, and provides additional information to the decision maker.¹⁴ This framework is well suited for trade-offs that involve many competing values associated with the natural resource, as it starts from the assumption that all ecosystem services should be evaluated. This framework equally considers services that are market commodities and those that are not, as well as services that provide use and non-use values. An ecosystem service approach can be used to address the full range of benefits and costs associated with a proposed alternative. In addition, the scale of an ecosystem service analysis can be adjusted to meet the needs of an individual project. While all ecosystem service analyses should share common elements, as described below, how these elements are achieved can depend on the needs of the project. For example, while it is important to estimate how ecosystem service values vary across alternatives, there are many different metrics and methods that might be used, including qualitative or quantitative, and monetary or non-monetary approaches. The best approach will depend on the needs and scale of the project. In general terms, ecosystem services can be characterized in quantitative or qualitative terms and, depending on the availability of data and resources available for the analysis, can be monetized. The PR&G analysis should quantify as many effects as possible, and monetize as many of the quantified effects as possible given the data and resource constraints.

B. Guidelines for Ecosystem Service Analysis

There are many ways in which the concept of ecosystem services can be used to organize an analysis of trade-offs and inform decision making. The purpose of this section is to identify key aspects of an ecosystem service analysis in the context of the PR&G that should be considered and documented. Both

¹⁴ Some examples to help illustrate the concept can be found at: <https://nespguidebook.com/assessment-framework/framework-overview/#4>; <https://nespguidebook.com/cms/wp-content/uploads/2014/11/FlowCharts19.pdf>; and <https://nespguidebook.com/cms/wp-content/uploads/2015/01/Figure-4-A-means-ends-diagram-for-fire-management-in-western-forests.pdf>

quantified and unquantified effects should be considered as part of an ecosystem services analysis. Effects should be monetized to the greatest extent possible.

Projects/activities that fall into the category of “standard analysis” should make significantly greater efforts to quantify and monetize impacts. The extent to which effects can and should be monetized should be made on a resource-by-resource basis and considering the estimated present value cost of the project/activity and the significance of the effects. Qualitative descriptions/analysis may be used as part of the ecosystem service framework. However, if initial analysis indicates that qualitative benefits represent a significant proportion (20% - 50% or more) of the total project benefits, then additional analysis must be undertaken to quantify the non-quantified services. Lack of resources alone is not a sufficient rationale for the lack of quantification and monetization of benefits. Efforts must be taken to quantify and monetize benefits for all projects/activities that exceed the financial thresholds for “standard analysis” identified in Table 1.

C. Social Assessments

The PR&G analysis should connect ecological and social analyses in order to provide decision makers with additional information as they select among alternative management actions, choose among sites, consider which projects to fund or conduct, and contemplate different policy options or scenarios. Early stakeholder engagement may be helpful in obtaining information that might be helpful in linking management actions to desired social benefits. The PR&G analysis should identify desired social outcomes which will be considered along with desired ecological conditions and then connected with potential management options to achieve the ecological and social objectives. Effects on individuals and communities to consider often include: social well-being; quality of life; safety, health, family and individual well-being; attitudes, beliefs and values (includes culture and religion); interaction with the environment; and other factors. Social impact assessments can include the following basic elements:

- (1) Description of the setting - Relevant history of the area and/or of the project or program, social history (including socio-cultural and socioeconomic factors) of the area, population and demographic trends.
- (2) Characterization of present conditions - current social conditions (i.e., social groups, socio-cultural values, issues, population, demographics, etc.).
- (3) Impact Analysis - forecast future social conditions without the plan and the potential social impacts under the plan’s alternatives.
- (4) Display Results - provide a comparison of the “with” and “without” project impacts and display tradeoffs.

D. Selecting Services for Evaluation

The specific ecosystem services and metrics considered in the analysis will depend on the specifics of the actions and resources evaluated. The analysis should consider, at a minimum on a qualitative basis, those ecosystem services important to the area and those most affected by the proposed action. The process of identifying ecosystem services and metrics should be well documented in the analysis.

E. Measuring Changes in Services Based on Changes in Ecosystem Structure or Function

- Final and intermediate goods and services: For a proper accounting of changes in ecosystem service value, it is important to fully articulate the processes and functions that relate ecosystem structure and processes to the benefits directly enjoyed by humans. The evaluation of benefits should then focus on the final endpoints of this relationship. These final services might be produced by one or more intermediate ecosystem services and supported by other ecological processes. The use of indices to capture changes is appropriate in some situations.
- Provision of services over time: The analysis of ecosystem service impacts should describe how these impacts are expected to change over time. This relationship can be complex, but should be described as completely as feasible. At a minimum, expected differences in short-term and long-term impacts should be identified.
- Uncertainty: There is often significant uncertainty in quantifying the impact of an action on ecosystem service production. The results should describe the sources and level uncertainty as completely as possible.

F. Identify Beneficiaries

- Location of Beneficiaries: The beneficiaries of ecosystem services are not always obvious. Many ecosystem services provide benefits indirectly, for example to those who live downstream from a wetland, or view scenic landscapes from a distance. Services that provide non-use values might provide benefits to individuals across the U.S., with no clear relationship between distance to the resource and value. An important aspect of evaluating ecosystem services is to identify those populations who will be impacted by a change in the resource. The results of this analysis should clearly define these groups and describe how the groups were identified.
- Distributional differences: In identifying beneficiaries, it is also important to identify subgroups within the population that may be affected differently. The stakeholder groups considered in the analysis will likely be defined by geographic location and other characteristics.

G. Analyze Relative Change in Ecosystem Service Value for each Alternative

- Describing Values: The PR&G require an analysis of water projects in terms of changes to ecosystem service flows over time. There are many different approaches to describing and measuring the change in ecosystem service flows and values. At a minimum, a qualitative discussion of the relative value of each alternative should be included. This discussion should include an assessment of all components of the total economic value, including both use and non-use value. In many cases, a qualitative assessment of ecosystem service values will provide additional information that can more fully describe the trade-offs among alternatives. Qualitative assessments of ecosystem services values may or may not include monetary estimates.

- **Distributional Differences:** Regardless of how ecosystem service values are measured, the analysis should clearly identify any subpopulations that may experience relatively greater or fewer net benefits under each alternative. In this context “subpopulations” could refer to humans or fish, wildlife, and plants.
- **Discounting:** The analysis should describe when benefits are likely to be realized, and when costs are likely to be incurred. To enable comparison of benefits and costs occurring at different times, appropriate discounting methods should be used when feasible. When discounting is not feasible, such as when benefits are not described monetarily, a discussion of the impact of waiting for future benefits should be included.
- **Uncertainty:** As with other stages of the analysis, there is often significant uncertainty in estimating the value of ecosystem services, particularly monetary values. The results should describe the level of uncertainty and the sources of uncertainty as completely as feasible.

VII. Economic Analyses

A. Introduction

As stated in the PR&G it is intended that Federal investments in water resources as a whole should maximize public benefits, with appropriate consideration of costs. Public benefits encompass environmental, economic, and social goals, include monetary and non-monetary effects and allow for the consideration of both quantified and unquantified measures. The focus of this section is to discuss the estimation of benefit values and impacts which can be monetized, including environmental and social effects, resulting from activities covered by the PR&G. This section provides brief descriptions of the economic analyses that are commonly used to evaluate Federal investments. The information presented in this section is not intended to be a “how to guide” or to provide comprehensive and specific instructions on how to implement any particular analytical method but rather provide general concepts. While the ASP do not prescribe the techniques to be used to quantify and monetize benefits, an ASP analysis must include information to justify the use of any particular technique as the most appropriate given the circumstances. In particular, use of the benefit transfer technique must be well documented. The justification of any economic valuation techniques used should include discussion on why the method is the most appropriate for the analysis, how it compares to other methods that could have been used (pros vs. cons), and what are the risks and uncertainties inherent in using that particular technique. The ASP allows for the use of new analytical techniques and methodologies, as they become available and cost effective. The economic analyses discussed in this section include:

- Benefit Cost analysis
- Regional Impact analysis
- Cost Effectiveness analysis
- Break-even Analysis

B. Benefit-Cost Analysis

The objective of a national economic benefit-cost analysis (BCA) is to evaluate the derived/estimated economic benefits and costs of an action and its effects on society. Beneficial and adverse effects are evaluated in monetary terms and are measured in terms of changes in national income, thus accounting for offsetting gains and losses across different regions of the Nation. Beneficial effects in a BCA are net increases, after accounting for costs, in the value of the national output of goods and services resulting from a plan, and improvements in national economic efficiency. Economic efficiency may be defined as maximizing output per unit of resource input, or conversely minimizing resource inputs per unit of output. Costs are represented as a loss in utility as measured by the opportunity cost (value of resources forgone) from an action. In theory, a BCA takes into account all quantitative and qualitative benefits and costs that accrue to society. However, in practice, due in part to a lack of information and technical limitations, it is rarely possible to quantify all of the costs and benefits. The exclusion of relevant costs and benefits biases the results and reduces the robustness of a BCA.

The results of the BCA are discounted to the net present value (NPV) in accordance with economic theory, for comparability. If the NPV is demonstrated to be positive, implying that present value of the benefits exceeds the present value of the costs, the project is considered to be economically justified given the capability to quantify available information and valuation methods employed.

1. Economic Values – Benefits

Economic values represent the utility (welfare or satisfaction) received or lost by an individual or society resulting from peoples' preferences and their resource utilization. The general measurement standard of the value of goods and services is defined as the willingness to pay (WTP) for each increment of output from a plan.¹⁵ Such a value would be obtained if the "seller" of the output were able to apply a variable unit price and charge each user an individual price to capture the full value of the output to the user, also known as "perfect price discrimination." Since it is not possible in most instances for the planner to measure the actual demand situation, various techniques, as presented below, are used to obtain an estimate of the total value of a plan. Some methods are more complex, data-intensive, and time-consuming than others to implement. The complexity of the analysis should match the scale, scope, and cost of the proposed project or plan. Note that the list of methods in the following subsections is not all-inclusive and other methods may be utilized under certain circumstances.

Monetized economic values can be categorized into two broad classifications of use and non-use. The delineation between these two value categories is due in part to preference, proximity, and timing.

¹⁵ In some situations where incur losses, willingness-to-accept may be used. The PR&G analysis must provide a rationale for using willingness-to-accept.

a) *Use Values*

Types of Use Values: Use values are derived from the use or consumption of specific resources or ecosystem services. Use values include both direct and indirect utilization of resources or ecosystem services.

- *Direct Use.* Direct use values encompass the values associated with human physical interaction and involvement with resources (e.g., timber harvested from the forest, water extracted from a stream for irrigation, pollination, and tourism). Direct use values can further be disaggregated into the subsets of “consumptive” use in which resources are actively consumed (e.g., logging, fishing) and “non-consumptive” use which do not deplete resources (e.g., certain types of recreation such as enjoying the scenic beauty of a natural vista).
- *Indirect Use.* Indirect use refers to the category of resources that are passively used to support humans or intermediary to what humans directly use, including: climate regulation, carbon sinks, flood control, animal and fish refugia, pollination, and waste assimilation from wetlands.

(1) *Methods for Estimating Use Values*

- *Actual or Simulated Market Price.* If, in an efficient market, the additional output from a plan is too small to have a significant effect on price, actual or simulated market price will closely approximate the marginal value of the output and may be used to estimate WTP. If the additional output is expected to have a significant effect on market price then an attempt should be made to estimate the marginal effects of the added output. As stated in the assumptions below, in this context projection planning is generally based on full employment economy; assumption of a full employment economy establishes a rationale for general use of market prices in estimating economic benefits and costs.
- *Change in Net Income.* When outputs of a plan are intermediate goods or services, the net income of the direct user may be increased. Where changes in net income of each individual user can be estimated, a close approximation of the total value of the output of the plan will be obtained. An example of this method is the increase in net farm income received from the use of irrigation water to produce agricultural commodities.
- *Cost of the Most Likely Alternative.* The costs associated with obtaining the desired output by the most likely alternative can be used to approximate total value. This method is not as strong methodologically as using WTP or change in net income methods and should typically only be applied as a stopgap. The cost of the most likely alternative will indicate the value of the output of a plan to the users assuming that society would, in fact, undertake the alternative. This method should only be used where a realistic alternative is available and there is a reasonable expectation that it would be undertaken in the absence of the Federal project. Adequate consideration should be given to nonstructural and demand management measures as well as structural measures. This method can be used in evaluating the benefits of projects for hydropower, municipal and industrial water supply, or for ecosystem services that can be

replicated through mechanical means, such as water quality improvements. This approach might encompass avoided costs.

- *Avoidance Expenditure Method.* This method considers the cost of actions taken to avoid harm as a way to value the experience of some current condition, absent the harm. For example, the expenditures a homeowner makes to reduce the risk of flood damage provide a lower bound estimate of the value placed on the current condition of the property and its setting.
- *Travel Cost Method.* Travel cost methods attempt to infer the value of a resource (such as a park or lake) by using information of the visitor's costs and tradeoffs in traveling to the site. With the cost information obtained a demand curve for WTP can be constructed and the values under study estimated. This method is useful for valuing recreation benefits.
- *Hedonic Valuation Method.* The Hedonic valuation models gather market data and utilize multiple regression analysis techniques to predict/forecast the significance and impact of the variable(s) under examination. The Hedonic models allow for the measurement of the marginal WTP for discrete changes in an attribute. An example of this method is a study that examines the effects of a proposed project or plan on property values.
- *Agent Based Modeling (ABM).* An ABM is a computational model for simulating the actions and interactions of autonomous individuals. The model attempts to represent the simultaneous actions of multiple agents, in an attempt to recreate and predict the actions of complex phenomena. The ABMs are particularly valuable because they can be used to assess the effects of aggregate behavior on the system as a whole. The ABMs combine some elements of game theory, complex adaptive systems, sociology and evolutionary programming. As an example, an ABM could be utilized to quantitatively estimate the extent of recreation use and the net increase in economic value which results from a park that does not currently exist.
- *Contingent Valuation (CV).* The contingent valuation method is based on survey responses to a proposed change in resource use or a change in the distribution of use. For example, the benefits to water users of converting from groundwater to surface water supplies could be estimated by asking water users their WTP for the project given improvements in municipal and industrial water quality and reliability that would result. In addition, other questions such as household income, current water costs, perceptions of current water quality and supplies, and other measures of need could be asked to understand the factors that influence WTP. The responses to some of these other questions can also be used to evaluate the representativeness or demographics of the survey respondents.
- *Conjoint Analysis (Choice Experiments).* Conjoint analysis is similar to contingent valuation in that it is a survey-based technique, but instead of asking participants to state their WTP, respondents choose between alternate states of the world. Each state of the world has a set of attributes, and a price. For example, a questionnaire on forest management might describe alternative management prescriptions with different options for the spacing of roads, treatment of dead and dying trees, and techniques of riparian protection, as well as the hypothetical payment the respondent would make to value each alternative. This method elicits economic values for sets of choices that more closely resemble management decisions than contingent valuation, but such surveys are correspondingly more complex to design and interpret.

- *Administratively Established Values.* Administratively established values are proxy values for specific goods and services cooperatively established by the resource management agencies. An example would be the range of unit-day values established for recreation by state or Federal agencies.

b) Non-Use Values

Non-use values reflect the common observation that people are willing to pay for resources, especially those involving changes in unique natural resources, which they may never directly or indirectly use.

Types of non-use values include:

- *Existence values.* Existence values are not derived from either direct or potential use and arises from the value placed on the intrinsic value of a resource apart from its use (e.g., individuals get pleasure from knowing a wilderness or animal and fish refugia exist).
- *Bequest values.* Bequest values arrive from and are based on the ideas of altruism. Bequest values are derived from individual's WTP for the pleasure they get from knowing that a resource is used by others, either currently or by future generations.

c) Methods for Estimating Non-Use Values

- *Contingent Valuation (CV).* This approach was discussed above. It is designed to estimate values for individuals who may never actually use or interact with the resource. The simplest version of this approach merely asks respondents what value they would place on an environmental change (such as the loss of a wetland) or preserving the resource in its current state. Use of this method needs to address hypothetical bias and other issues that arise in the context of implementing this method.
- *Conjoint Analysis.* Again, this is the same method as defined under use values, but the survey is conducted on participants whom do not directly use the resource. This is a complex and evolving analysis approach that has great potential in mitigating some of the concerns with the robustness of the CV method.

d) Benefit Transfer

Another economic benefit valuation method that applies to both use- and non-use values is the benefit transfer method. The benefit transfer method uses results from other similar studies to estimate benefits. Site-specific and project-specific variables and assumptions used in an economic analysis can cause results of the benefit transfer method to be less reliable and more uncertain when applied to other studies. Therefore, additional justification is required when the benefit transfer method is used, and caution should be observed when interpreting or reporting results. The justification should include a discussion on the method originally used to derive the benefits that are being transferred, and the approach chosen for the benefits transfer. Some possible approaches for benefits transfer include basing the transfer on: point estimates; an estimated function from the original study; and results from meta-analyses. Preferably, benefit transfer should primarily be used in lesser-scale projects or plans

that are employing a “scaled analysis” instead of a “standard analysis,” or only for specific effects that have limited impact.¹⁶

e) Other Direct Benefits and Externalities

Many economic activities provide incidental benefits which represent net increases in national economic efficiency to parties other than those for whom the project was intended. The occurrence of these benefits are considered incidental or external to the main project beneficiaries and the purpose for which the plan is being formulated.

A beneficial externality can be defined as an increase in utility or welfare due to the increase in output of goods and services and incidental reductions in production costs to indirect beneficiaries under conditions with the project. The increase or reduction is compared to conditions without the project less the opportunity cost of any additional factors of production employed by the indirect beneficiaries to determine the net effects.

The term "indirect beneficiaries" in this definition means firms or individuals benefitting from the project other than the direct users of project outputs. The term "Opportunity cost" means the income, produced by a factor of production in its next best alternative use. This concept is a critical part of the definition because only the increase in goods and services of production over its return without the project may be properly identified as an externality. For example, the return to labor and capital resources imported into the project area would not be considered an externality because presumably these resources could have earned an approximately equal return elsewhere in the national economy.

There are no uniform factors which can be applied to direct benefits to estimate other direct benefits/externalities, but the same methods or procedures used to measure direct benefits can be used. Identification and measurement must be treated on a case-by-case basis and care should be taken to eliminate the possibility of any double counting.

2. Economic Values – Costs

The discussion on values would be incomplete without a discussion of the cost aspects of a BCA. The basis of valuing costs originates in the theory of “opportunity costs,” which is defined as the forgone value that would have resulted from the utilization of resources in the next-best alternative, given the preference of the individual or populace under study. An example of opportunity cost, as it relates to time, is the value of work or leisure activities foregone when traveling to a recreation site.

The associated costs are broadly defined to include all aspects of the economic value of the resources required to construct, manage, operate, maintain, or replace the features of a project whether structural or nonstructural throughout the period of analysis. The BCA costs should reflect the salvage value of land, equipment, and facilities that may have value at the end of the analysis period.

¹⁶ A concise summary on the uses of benefit transfer, including a summary of databases and analysis tools can be found in: Richardson, L, *et al.*, 2015, “The Role of benefit transfer in ecosystem service valuation,” *Ecological Economics*, 115: 51-58.

Consideration should be given to the direct private and public uses that producers and consumers are currently making of available resources or are expected to make of them in the future.

If market prices reflect the full economic value of a resource to society, they are to be used to determine project costs. When market prices do not reflect these values then an estimate of other direct costs should be included. Surrogate values can be used appropriately to adjust or replace market values. Surrogate values are an approximation of opportunity costs based on an equivalent use or condition in restricted markets or non-market situations.

a) Cost Categories

(1). **Implementation Outlays.** These are financial outlays incurred by the organization and, where appropriate, contributed by other Federal or non-federal entities incurred for the implementation of a project and/or to place it in operation. They include estimates of construction costs; corollary costs, such as transitional development costs; transfers of investment costs from related projects; interest during construction; operation, maintenance, and replacement costs; and any other implementation cost, such as relocating facilities, archeological and historical salvage costs, or mitigating damages.

(2). **Associated Costs.** These are costs associated with the project in addition to the implementation outlays which are needed to achieve the benefits claimed during the period of analysis. An example would be on-farm irrigation water supply costs that are necessary for the realization of irrigation benefits.

(3). **Other Direct Costs/Negative Externalities.** Other direct costs/negative externalities are the reverse of other direct benefits/externalities as discussed previously. The concept is the same except in this instance the effect is harmful. Other direct costs/negative externalities include costs for which no implementation outlays are made. Those costs that are uncompensated become project costs and are included in the economic analysis of a plan. Other direct costs include losses in production efficiency due either to some harmful product of the project (e.g., pollution) or reduction in the scale of output due to displacement of some activity by the project. One example would be the loss of existing project irrigation benefits if a project is re-operated to maintain instream flows for environmental purposes. Another example would be lost power generation ability downstream due to a plan for increased upstream water depletions. External costs may also be imposed directly on consumers such as the effect of a project-induced road relocation which results in increased transportation costs to users of the route. External cost can include costs associated with lost or damaged ecosystem services.

C. Regional Impact Analysis

1. Introduction

The regional impact analysis measures the effect of the alternatives on the region's local economy. This analysis is completed by measuring the changes in the distribution of regional economic activity as a result of an action and does not account for gains or losses outside the region of study. The regional analysis typically measures the changes in employment, income, and industry output resulting from an action.

The regional analysis is important to local interests where an action is under consideration. An action that will attract new sources of revenues and activities to a region may result in increased employment, income, and production to that region. Local government officials, business leaders, and the general population would likely want to know the extent of these impacts for future planning purposes and how their community would be affected. If the local economy is currently experiencing high unemployment and low income levels, then the action may be encouraged locally. However, if the action is perceived as causing growth related problems such as overcrowding and high housing costs with little benefit, then the action may be opposed locally. The regional analysis provides information to local parties most affected by a proposed action and estimates the effect of the action on the local economy.

A regional analysis is distinctly different from an economic benefit-cost analysis (BCA). The regional impact analysis is a measure of regional activity, whereas the economic benefit cost analysis is a measure of economic benefits to the nation as a whole. The results of the BCA and the regional impact analysis are not directly comparable because they do not measure the same effects. As stated earlier, the BCA measures net benefits, which represent the value of a resource or resource-related activity to society. The regional impact analysis measures regional impacts, which are flows of money (or employment) into or out of a defined region. The regional impacts from an action may result in substantial increases in income or employment within a specific region, but may generate little or no benefits to society at the national level. It is also possible that an action may result in reduced regional output and income in a particular area, while generating positive benefits to the nation as a result of potential environmental enhancement activities or other improvements which are not translated into actual money flows.

2. Regional Impact Methods

A variety of regional impact methodologies are available, each having distinct advantages and disadvantages. The choice of a regional impact estimation method depends ultimately on the size and complexity of the region under consideration, the magnitude and types of changes in expenditures associated with the action under consideration, the time and budget available to complete the impact analysis, the level of detail required, and the information available. The four commonly used methods are 1) economic base, 2) income-expenditure, 3) input output, and 4) computable general equilibrium (CGE). New analytical techniques and methodologies may become available and cost effective in the future, these guidelines allow for their adoption.

The economic base and income-expenditure methods are the most simplistic approaches and are generally best used in analyses that require less precision in the estimated impacts, in analyses of regions that are relatively small and uncomplicated, and in cases where the study budget is insufficient to fund a more sophisticated analysis.

Input-output analyses are better for larger impact regions that have more complicated trade patterns and more complex production and consumption relationships. The input-output method is presented in the greatest detail because it is currently the most widely used technique for estimating regional impacts and is most applicable to the types of analyses performed for evaluating alternatives.

The CGE models can account for price changes related to changes in input requirements and substitution of inputs that may occur as a result of the impacts under consideration in the analysis. As a result, an analysis based on a CGE model is most appropriate when impacts are estimated for a large change in production and output that would affect regional input and output prices.

Regardless of the method used to estimate impacts from a project or action, there are three basic steps in a regional impact analysis:

- Determine the impact region of concern.
- Identify the types of activities that will be affected by the action under consideration and the level of expenditures associated with each. Activity categories could include construction, agricultural production, recreation visitation, power generation, municipal and industrial water supplies, direct government payments to households or businesses in the region, and many others. Expenditure categories, for example, may include items such as groceries, gasoline, utilities, vehicles and other equipment.
- Determine the changes in expenditures that represent a true change in final demand. That is, expenditures that occur in the region must be separated from expenditures that occur outside the region.

D. Cost Effectiveness – Incremental Cost Analysis

The cost effectiveness is a method that seeks to identify the least-cost way to achieve a given objective. Cost effectiveness is derived by dividing the total discounted costs by the physical output or service that is generated by the project over the period of analysis. A cost-effective plan is one that, for a given level of output, there is no other plan that costs less.

A cost effectiveness analysis should be used when a level of service is mandated and thus the objective of the analysis is to determine which program or alternative under consideration achieves the mandated level at the lowest cost (e.g. dam safety projects). When projects or alternatives are mandated it is assumed that the economic benefits outweigh the costs. However the limitation of a cost effectiveness

analysis is that the analysis may not provide the necessary information to determine if project or alternative provides net economic benefits.

The incremental cost analysis is a process to identify efficient alternative plans by comparing the additional costs to the additional outputs of an alternative. It is particularly useful when evaluating quantified, but non-monetized benefits. It can be applied when the purpose of the plan is to maximize a particular output at the lowest cost possible. The subset of cost effective plans are examined sequentially (by increasing scale and increment of output) to ascertain which plans are most efficient in the production of benefits. Those most efficient plans provide the greatest increase in output for the least increases in cost. They have the lowest incremental costs per unit of output. Usually, the incremental analysis by itself will not point to the selection of any single plan. The results of the incremental analysis must be synthesized with other decision-making criteria (for example, significance of outputs, risk and uncertainty, reasonableness of costs) to help the planning team select and recommend a particular plan.

E. Break-Even Analysis

The term break-even point is used to describe the point at which benefits exactly equal costs. A break-even analysis can be used as a method of quasi-monetization, when applying it to a plan that has both monetized and non-monetized benefits, and requires the inclusion of non-monetized benefits for the plan to be economically justified. The break-even analysis determines how large or small the monetary value of an impact would need to be to have a material effect on the alternative plan, i.e. switching the plan from economically unjustified to justified, in a traditional benefit-cost analysis.

The break-even analysis enables a fully monetized decision making process, in cases where monetization of previously non-monetized benefits is necessary for economic justification. If certain categories of benefits or costs are not monetized, a separate calculation should be performed to display the magnitude of the present value costs that would be required to switch the project between economically unjustified (benefit-cost ratio less than 1:1) and justified (benefit-cost ratio greater than or equal to 1:1). The accompanying text to this analysis should provide a discussion regarding the extent to which the value calculated for the non-monetized benefits is reasonable.

F. Common Assumptions

The purpose of this section is to identify a set of common assumptions that would be used across all of the bureaus. Common assumptions could include the following:

1. Full Employment

Full employment will be assumed except in regional planning areas with persistently high rates of chronic unemployment. Plans and project evaluation will be based on projections of income, employment, output, and population, and the amounts of goods and services that are likely to be

demanded. The actual or projected needs for ecosystem services will be related to these projections (which are often subject to considerable uncertainty).

2. Period of Analysis

The period of analysis should be the shorter of 1) the period of time over which the plan, project, or activity being analyzed can reasonably be expected to have beneficial or adverse effects, or 2) a period of time not to exceed 100 years. The analyst should also consider environmental factors that may extend beyond the period of analysis. All alternatives should be evaluated over the same period of analysis using a consistent set of underlying assumptions.

3. Prices

The prices used in evaluation should reflect the real exchange value expected over the period of analysis. For this purpose, relative price relationships and the general level of prices prevailing during the planning study will be assumed to hold generally for the period of analysis, except where specific studies and considerations indicate that prices will increase or decrease at a rate different than the overall national inflation rate (an increase in real prices). The general level of prices for outputs and inputs prevailing during or immediately preceding the period of planning is to be used for the entire period of analysis unless a rationale can be presented that support the use of prices that change over the period. In the case of agricultural planning, normalized prices prepared by the Department of Agriculture should be used.

4. Technology

Benefits and costs may change over time due to such causes as technological advances, population growth, and changes in use. The assumed period for projecting growth in benefits may vary among purposes/activities/programs depending upon the reliability of data and other pertinent factors in a given situation. However, because of the inherent uncertainties of future projections and the effect of discounting, caution should be exercised in extending the assumed period of growth in benefits beyond 20-25 years. Although the period of analysis may be longer (up to 100 years), the annual amount of benefits should remain constant after a buildup period of 50 years or less.

5. Discount Rates

The rate at which future costs and benefits are discounted is called the discount rate and discounting is the method for converting costs and benefits that occur at different points in time to a present value. Net benefits are to be adjusted for time of occurrence to annual equivalent values over the period of analysis by use of the interest or discount rate. For analysis of Federal water resource investments the discount rate is often prescribed in the Federal requirements pertaining to the analysis (e.g., OMB circular A-94). The approach to discounting required under existing OMB guidance can generally be termed "exponential" discounting. However, there are a number of other approaches (e.g., Ramsey; hyperbolic; Gamma, etc.) that could be considered in the context of sensitivity testing if appropriate. Intergenerational effects, such as methods that employ a declining discount rate, may be used in cases of long-lived Federal investments or investments that have substantial costs and/or benefits near the

end of the period of analysis. Use of these alternative approaches should be discussed with the Department's Office of Policy Analysis.

Where not precluded from doing so, real interest rates should be used. Generally the established rates must be used, with a few exceptions such as safety of dams.

VIII. Decision-Making and Display of Tradeoffs

A. Introduction

A key component of the PR&G is documenting and displaying tradeoffs in a manner that informs decision making. Such displays should be understandable, transparent, and constructed in a generally consistent fashion for all PR&G analyses. A PR&G analysis should include a combination of both tables and explanatory materials to help inform a decision. Displays should facilitate the evaluation and comparison of alternative plans necessary to make the following determination and reflect the following:

1. The effectiveness of given plans in solving the problems and taking advantage of the opportunities identified in the planning process.
2. What must be given up in monetary and nonmonetary terms to enjoy the benefits of the various alternative plans, relative to the baseline.
3. The differences among alternative plans.

B. Planning for Conducting a PR&G Analysis

Bureaus and Offices will consult with the Office of Policy Analysis, which is responsible for reviewing regulations identified as "significant" under EO 12866, prior to undertaking a standard PR&G analysis. The purpose of this consultation is to discuss the scope and nature of the analysis.

C. Components of the analysis

To promote consistency across bureaus the following tables and information should be included in the analysis and in the documentation prepared for a decision process:

- **Criteria.** The P&R, the IG, and the ASP identify the following criteria for evaluating alternatives: completeness, effectiveness, efficiency, and acceptability. A PR&G analysis must explicitly address the extent to which an alternative or activities achieves each of these criteria as defined by the P&R. This evaluation must be systematic, but can include both quantitative and qualitative components.
- **Resource/ecosystem service tradeoff matrix.** A matrix summarizing the tradeoffs, relative to the baseline, resource-by-resource. The matrix must include information on the financial elements of a project/activity. For example, if the project or activity involves repayment by non-federal entities, lease payments, or other financial considerations are required then the table must

display the magnitude of the annual payments as well as the present value of the payments over the life of the project/activity. The matrix should be constructed using an ecosystem service framework, and include the following:

- The annual and total estimated changes in the quantity and/or quality of each affected resource relative to the baseline over the period of analysis. The metrics used to evaluate changes in services and display tradeoffs must be clearly defined. Estimates of changes to relevant benefit indicators relative to baseline may be used. The Federal Resource Management and Ecosystem Services (FRMES) online guidebook provides more information: <https://nespguidebook.com/?s=benefit+relevant+indicator&input.x=7&input.y=9>
- A quantitative measure of affected ecosystem services, even if not monetary, that goes beyond biophysical measures to address relevant social welfare.
- Changes in estimated benefits should be quantified and monetized to the greatest extent feasible. The value of the project benefits should be presented on an annual basis over the period of analysis as well as in present value terms.
- The major structural and non-structural features of the recommended plan, any special considerations for implementation, and the estimated cost of implementation should be provided in the analysis. Costs relative to the baseline must be quantified and presented on an annual basis as well as in present value terms.
- Estimates of the annual changes in the relevant ecosystem services, relevant time periods over which the changes are anticipated to occur; and
- The level of certainty associated with each estimate.
- Additional trade-off displays. If appropriate, text and tables must be included that display other important trade-offs, e.g. trade-offs along temporal, spatial, and beneficiary dimensions.
- Summary table. A summary table displaying the present value of benefits, costs, and net benefits (benefits less costs). Include all benefit estimates, regardless of the technique used to estimate them, in the table. To the extent feasible, all cost and benefit estimates should be accompanied by either quantitative or qualitative estimates or descriptions of the certainty of the estimate. The summary table should include entries for any benefits and costs that are not monetized and briefly provide a rationale for why they were not monetized. The text of the analysis must include a more in depth discussion of these issues.
- Achievement of objectives table. A table indicating the extent to which the PR&G “Guiding Principles” have been achieved. The information in this table may be qualitative in nature. Each of the “Guiding Principles” must be addressed individually.
- Risk and uncertainty. Knowledge of risk and uncertainty and the degree of reliability of the estimated effects will better inform decision making. Risk and uncertainty is inherent in economic analyses as well as the analysis of physical and biologic factors, no matter the technique or methodology employed. The analyses should identify areas of risk and uncertainty and describe them clearly, so that decisions can be made with knowledge of the degree of reliability of the estimated results and of the effectiveness of alternative plans. Risks and

uncertainties should be quantified where feasible. The economic analyses need to reflect the uncertainty inherent in the data or various assumptions as to future economic, demographic, environmental, and technological trends. Various projections and assumptions of reasonable alternative forecasts, if realized, should be analyzed to determine if they would appreciably affect estimated results. Sufficient information should be provided such that decisions can be made with knowledge of the degree of reliability and the limits of available information, recognizing that even with the best available engineering and science, risk and uncertainty will always remain.

D. Peer Review

Each bureau must establish a peer review process for standard PR&G analyses. Peer reviewers may be drawn from the Department or any bureau. The Peer Review must accompany the final PR&G analysis. Projects/activities that are associated with costs that are estimated to exceed \$100 million (present value) must include at least one peer reviewer selected by the DOI's Office of Policy Analysis. Peer review is especially important in cases where non-quantified benefits play a role in project justification.

E. Decision making

The DOI investments should maximize the present value of net public benefits. It is possible that more than one alternative might "reasonably and approximately" (IG, p. 27) maximize public benefits relative to costs. "Net public benefits" implies that the anticipated benefits will be presented relative to the costs associated with the accrual of those benefits. Net public benefits can include both quantified and non-quantified benefits.

Public benefits should evaluate net changes in economic values associated with the market and nonmarket goods and services associated with alternative plans as well as changes in the economic values associated with external costs. If public benefits are attributed to otherwise unemployed or under-employed labor resources, the analysis must include a sufficient level of detail to support the inclusion of such benefits. Adverse effects should be valued at the opportunity costs of resources used in implementing a project, plan, or activity. These adverse effects could include: Implementation outlays, associated costs, the value of lost ecosystem services, and other direct costs.

The PR&G analysis must include a section documenting the basis for selecting a preferred alternative. This section must provide a benefit-cost analysis (conducted in accordance with the general Federal guidance for these types of analysis as well as this guidance) and a discussion about the extent to which the preferred alternative maximizes net public benefits.

A recommended plan for a Federal water resource investment that does not maximize net public benefits requires a Secretarial Exception. Requests for Exceptions should be in the form of a memorandum from the bureau director through the relevant assistant secretary to the AS – PMB. The memorandum should describe the project or activity, the rationale for the exception, and present relevant data and analysis to support the request.

The identification of an environmentally preferred alternative is required in the Record of Decision (ROD). The environmentally preferred alternative identified for the NEPA analysis is not required to be the same as the recommended plan.

If cost-share partners/local sponsors prefer an alternative plan that is different from the recommended plan, it will be identified as the locally preferred plan. The locally preferred plan will be required to have a comparable level of detail and follow the same analytical framework as the recommended plan to allow close comparison by decision makers.

If the basis for selecting the preferred alternative depends on non-monetized benefits (or costs) the analysis must include the following:

- A detailed justification and explanation of the relative importance of these benefits;
- A detailed discussion of why these benefits cannot be monetized. For many ecosystem services in specific contexts, information may not be readily available on the relevant biophysical or ecological production functions. These functions may be necessary to quantify and monetize marginal changes in service flows. If the benefits cannot be monetized, the analysis must include a discussion of the costs associated with such monetization, if they were to be monetized. In addition, if the benefits cannot be monetized because the bureau makes a decision to not allocate internal resources to undertaking the necessary studies, then analysis must include information on the estimated costs associated with monetization, presented in proportion to the total estimated cost of the project and the costs associated with other physical or biologic studies that have been determined to be necessary;
- To the extent feasible, an estimate of their stocks and flows in physical and biologic terms on an annual basis over the period of analysis; and
- An explanation for why their value (even if not monetized) might be anticipated to offset estimated costs over the period of analysis.

IX. Appendix A: Examples of Analyses Using an Ecosystem Services Framework

Project/activity	Bureau	Description of Analysis	Additional information
Klamath hydropower relicensing	Reclamation	Estimation of net economic benefits based on analysis of the following categories: commercial fishing, in-river sport fishing, ocean sport fishing, irrigated agriculture, refuge recreation, nonuse values, tribal effects, hydropower, project costs (facilities removal, site mitigation, restoration), reservoir recreation, and whitewater recreation. Costs and benefits that could not be quantified were considered qualitatively. These included tribal cultural resource values and hydropower ancillary services. This analysis was conducted in accordance with the P&Gs.	http://klamathrestoration.gov/keep-me-informed/secretarial-determination/role-of-science/secretarial-determination-studies
Colorado River Use and Non-Use Values	NPS	NPS is currently analyzing the comprehensive economic values (direct recreational use, passive use, and regional economic impacts) to include ecosystem services values for water-related activities in national parks along the Colorado River (Glen Canyon, Grand Canyon, and Lake Mead). This study will provide data for the economic analysis of the alternative management and operation protocols that will be one piece of information that the Secretary of the Interior will use to evaluate future dam operation plans associated with the current ongoing Glen Canyon Draft Environmental Impact Statement (DEIS).	http://www.reginfo.gov/public/do/PRAViewDocument?ref_nbr=201404-1024-001

Project/activity	Bureau	Description of Analysis	Additional information
Yellowstone National Park Snowmobile Management	NPS	NPS included ecosystem services (noise emissions, air pollution emissions, congestion, and health and safety risks) in its evaluation of winter use management alternatives. Alternatives were analyzed to identify the one producing the greatest consumer surplus benefits. This analysis was consistent with EO 12866 and other guidance on evaluating regulations.	http://www.nps.gov/yell/learn/management/winter_monitoring.htm
Fire Program Management	BLM	BLM used ecosystem services to evaluate the efficiency and effectiveness of hazardous fuels treatment; assess successful behavioral changes associated with education and outreach activities; and determine which BLM fuel reduction project(s) offers the highest return on the investment when considering the ecosystem goods and services. This study considered both market-based and non-market values that are at risk from wildfire.	http://rmgsc.cr.usgs.gov/outgoing/ES/fire_climate_pubs/BLM_CA_Fire_report_cost_benefit_2005.pdf
Valuing Ecosystem Goods and Services Provided by Refuges	FWS	The analysis compared wetlands on four national wildlife refuges to illustrate how existing data can be used to estimate the average annual economic benefits of specific ecosystem services from different types of wetlands. Benefit transfer was used.	http://www.fws.gov/economics/Discussion%20Papers/USFWS_Ecosystem%20Services_Phase%20I%20Report_04-25-2012.pdf
Amenity Value of Proximity to Refuges	FWS	This analysis quantified the benefits to property owners of open space associated with proximity to a National Wildlife Refuge. The results of this study help refuge managers improve communications with local stakeholders regarding how management actions on the refuge provide ancillary benefits to the surrounding land and homeowners.	http://www.fws.gov/economics/Discussion%20Papers/2012_4.NWRSamenityReportApril2012withCovers8.pdf

Project/activity	Bureau	Description of Analysis	Additional information
Natural Resource Damage Assessment and Restoration Program	OS, BLM, NPS, BIA, FWS	The mission of the DOI's inter-bureau program is to restore natural resources injured as a result of oil spills or hazardous-substance releases. Ecosystem services are often used to evaluate the services lost by the public and to determine the nature and extent of restoration activities to compensate the public for resource-related losses.	http://www.doi.gov/restoration/index.cfm
Everglades Restoration	USGS	This study evaluated the value of ecosystem services that will be affected by restoration activities in Florida's central Everglades. The study monetized the value of select ecosystem services using existing data and benefit transfer methods, and provided a qualitative description of those services that will not be significantly impacted by restoration activities or cannot be valued monetarily due to a lack of existing data.	https://www.fort.usgs.gov/science-tasks/2461
Moab Master Leasing Plan: Ecosystem Service Valuation Study	BLM	This project evaluated groundwater, surface water, recreation, and aesthetic related ecosystem services in order to support the Moab and Monticello Field Offices in their effort to complete the Master Leasing Plan (MLP). The MLP considers the leasing of public lands in east-central Utah for oil, gas and potash developments and potential associated impacts on recreational uses on BLM and adjacent lands and regional water resources.	http://www.blm.gov/ut/st/en/fo/moab/MLP.html
Jump Creek, Succor Creek, and Cow Creek Watersheds Grazing Permit Renewal Draft EIS	BLM	In this draft EIS, ecosystem services were identified in concept and various methodologies were described for possible future monetary estimates of some ecosystem service values. The intent was to highlight the benefits that would be generated by the ecosystems in question if they were in a healthy, thriving condition.	https://www.blm.gov/epl-front-office/projects/nepa/24953/43104/46090/Group2DEIS_April_22_2013_508.pdf

Project/activity	Bureau	Description of Analysis	Additional information
Benefit Transfer and Visitor Use Estimating Models Toolkit	USGS	Web-based, publically accessible toolkit that synthesizes some of the existing ecosystem service valuation literature and allows users to use existing data and meta-functions to monetize the value of particular ecosystem services. Currently available at Colorado State University (http://dare.colostate.edu/tools/benefittransfer.aspx) and in the process of being updated and migrated to a USGS website.	
San Pedro Watershed study	BLM, USGS	This project evaluated alternative methods and tools to quantify and value ecosystem services, and assessed the tools' readiness for use in BLM's decision making process. The tools were tested on the San Pedro River watershed in northern Sonora, Mexico and southeast Arizona.	http://pubs.usgs.gov/sir/2012/5251/sir2012-5251.pdf
LTEMP	Reclamation	As part of the analysis for this project, a passive use study is being conducted, which surveys the public for the 'existence value' of different aspects of the resources and issues related to the LTEMP. This information collection process concerns the value of National Park System Resources along the Colorado River Corridor from the Glen Canyon Dam through Grand Canyon National Park. This information collection process will provide data for the economic analysis of the alternative management and operation protocols that will be one piece of information that the Secretary of the Interior will use to evaluate future dam operation plans associated with the current ongoing Glen Canyon LTEMP EIS.	

Project/activity	Bureau	Description of Analysis	Additional information
Climate change and land use change	USGS	This research study is an example of a study that evaluates the potential impacts of climate change on rangeland ecosystem services. The study area is the Central Valley of California. The approach used is a scenario-based approach that quantified baseline and projected changes in wildlife habitat, soil organic carbon, and water supply. No monetization was done.	<i>Integrated climate and land use change scenarios for California rangeland ecosystem services: wildlife habitat, soil carbon, and water supply.</i> Kristin B. Byrd et al. <i>Landscape Ecology</i> , 30:729:750, 2015. Online at: http://link.springer.com/article/10.1007%2Fs10980-015-0159-7#page-1

X. Appendix B: Illustrative Inventory of Ecosystem Services and Associated Benefits

Illustrative Benefit	Illustrative Ecosystem Service
Harvests	
Managed and commercial	Pollinator populations, soil quality, shade and shelter, water availability,
Subsistence	Target fish, crop populations
Unmanaged marine	Target marine populations
Pharmaceutical	Biodiversity
Amenities and fulfillment	
Aesthetic	Natural land cover in viewsheds
Bequest, spiritual, emotional	Wilderness, biodiversity, varied natural land cover
Existence benefits	Relevant species populations
Damage avoidance	
Health	Air quality, drinking water; quality, land uses or predator; populations hostile to disease; transmission
Property	Wetlands, forests, natural land Cover
Waster Assimilation – avoided disposal cost	Surface and groundwater, open land
Drinking water provision – avoided treatment, pumping and transport cost	Aquifer, surface water quality; aquifer availability
Recreation – birding, hiking, angling, swimming	Relevant species population, natural land cover, vistas, surface waters; surface water, target population, natural land cover; surface waters, beaches
Source: Boyd, J. and Banzhaf, S. 2007. “What are ecosystem services? The need for standardized environmental accounting units,” <i>Ecological Economics</i> , 63: 616-626.	