

**Appendix A1**  
**Driving Forces Survey**

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# Appendix A1 — Driving Forces Survey

## 1.0 Instructions/Guidance for Completing the Colorado River Basin Water Supply and Demand Study Driving Forces Survey

### 1.1 Survey Objectives

The Plan of Study, provided in Driving forces represent the key factors that affect the reliability of the Colorado River system over time. The attached survey is intended to receive input from representatives of water agencies, other federal and state agencies, Native American Tribes and communities, other stakeholders, and other experts on the relative importance and uncertainty of each of the driving forces over the next 50 years. The overall objective of the survey is to identify the critical uncertainties that will form the basis of storylines and scenarios for the Colorado River Basin Water Supply and Demand Study (Study). Critical uncertainties are key driving forces that are both highly important and highly uncertain.

The purpose and objectives for the Study can be expressed in two fundamental questions:

1. What is the future reliability of the Colorado River system to meet the needs of Basin resources through 2060?
2. What are the options and strategies to mitigate future risks to these resources?

The first question relates directly to incorporating uncertainty and is the focus of the scenario development process. This survey is an important element in that process. The second question relates to management responses to the potential impacts under uncertain futures and is the focus of the water management option and strategy development. This question will be addressed in the “options and strategies” phase of the Study.

### 1.2 Survey Format

The survey includes a list of driving forces that influence the future reliability of the Colorado River system. The respondent is requested to independently rate (using a scale of 1 through 5, with 5 being the highest) the relative “importance” and “uncertainty” associated with each driving force with respect to the key question or focal issue of the Study being addressed through the scenario development process:

- **Importance (1 through 5):** Rate the relative importance of the driving forces to the reliability of the Colorado River system to meet the needs of Basin resources through 2060
- **Uncertainty (1 through 5):** Rate the relative uncertainty of the driving forces in the Colorado River Basin through 2060

The respondent is encouraged to provide comments related to each response. Such comments will help the Study Team better analyze the data received, particularly for high and low ratings.

### **1.3 Guidance for Completing the Survey**

The driving forces list is intended to be relatively broad to capture the large-scale mechanisms that influence the system reliability. Not every variation on a driving force category is necessary at this point in the scenario development process as details of the critical uncertainties will be explored in the next steps of the scenario development process. However, please provide any comments you have that may help us better understand your views regarding a particular driving force.

Some additional guidance may be helpful in the completion of the survey:

1. Relate all ratings to the key question/focal issue
  - a. What is the reliability of the Colorado River system to meet the needs of Basin resources through 2060?
2. Consider the current influence of the driving force in addition to evolving trends and the range of effects of the driving force through 2060
  - a. How important is the driving force on the system today? What are the current trends in these forces? Are the future trends likely to following the same trajectory? What is the magnitude of these influences?
3. Distinguish between “external” factors (i.e., those factors that are largely outside of the control of water management entities) and “internal” factors (i.e., those factors that are largely within the control of water management entities and will be addressed in the “options and strategies” phase of the Study)
  - a. Consider each factor in the context of the forces that are largely “external” to the control of water management entities.
4. Keep your ratings of importance and uncertainty separate
  - a. Importance is a relative measure of the magnitude of the influence of a driving force on system reliability.
  - b. Uncertainty is a relative measure of the likelihood of occurrence of the driving force over the planning horizon.
5. Keep in mind that the survey is a relative comparison
  - a. You may wish to make two passes through the survey—the first to gauge an initial baseline and the second to align the relative rating of all driving forces.

## **1.4 Complete and Return the Survey**

Please complete the survey, indicating 1 through 5 in the “importance” and “uncertainty” columns for each driving force. Please add comments that will help to convey the reasons for and the intent of a specific rating.

The survey responses can either be typed directly into the form or filled out by hand.

Please return the survey to Amber Cunningham via email ([AZCunningham@usbr.gov](mailto:AZCunningham@usbr.gov)) or fax to (702) 293-8156 by 12:00 PM PDT on Thursday August 26.

Please call Amber at (702) 293-8472 if you have questions/problems.

**TABLE A1-1**  
Table of Driving Forces and Survey Relating to Importance and Uncertainty

<b>Name/Organization (optional):</b>
<b>Importance (1–5):</b> Rate the relative importance of the driving forces to the reliability of the Colorado River system to meet the needs of Basin resources through 2060
<b>Uncertainty (1–5):</b> Rate the relative uncertainty of the driving forces in the Colorado River Basin through 2060
Importance Rating Guidance: 1=Relatively Unimportant, 3=Important, 5=Extremely Important
Uncertainty Rating Guidance: 1=Relatively Certain, 3=Uncertain, 5=Highly Uncertain
NA=Enter “NA” if you are unfamiliar with the driving force (Note: will not be included in final rating)

No.	Driving Forces	Importance	Uncertainty	Comment
1	Changes in streamflow variability and trends			
2	Changes in climate variability and trends (e.g., temperature, precipitation, etc.)			
3	Changes in watershed conditions (e.g., diseases, species transitions, etc.)			
4	Changes in population and distribution			
5	Changes in agricultural land use (e.g., irrigated agricultural areas, crop mixes, etc.)			

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No.	Driving Forces	Importance	Uncertainty	Comment
6	Changes in urban land use (e.g., conversion, density, urbanization, etc.)			
7	Changes in public land use (e.g., forest practices, grazing, wilderness areas, etc.)			
8	Changes in agricultural water use efficiency			
9	Changes in municipal and industrial water use efficiency			
10	Changes in institutional and regulatory conditions (e.g., laws, regulations, etc.)			
11	Changes to organization or management structures (e.g., state, federal, bi-national institutions, etc.)			
12	Changes in water needs for energy generation (e.g., solar, oil shale, thermal, nuclear, etc.)			
13	Changes in flow-dependent ecosystem needs for ESA-listed species			
14	Changes in other flow-dependent ecosystem needs			

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No.	Driving Forces	Importance	Uncertainty	Comment
15	Changes in social values affecting water use			
16	Changes in cost of energy affecting water availability and use			
17	Changes in water availability due to tribal water use and settlement of tribal water rights claims			
18	Changes in water quality including physical, biological, and chemical processes			