Linking Data Collection with Decision Making - The California Perspective on Managing Uncertainty with Instream Flow Regime Assessments

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Data Collection

Decision Making

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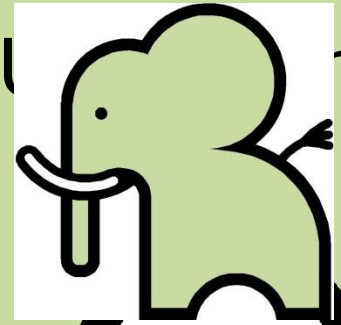
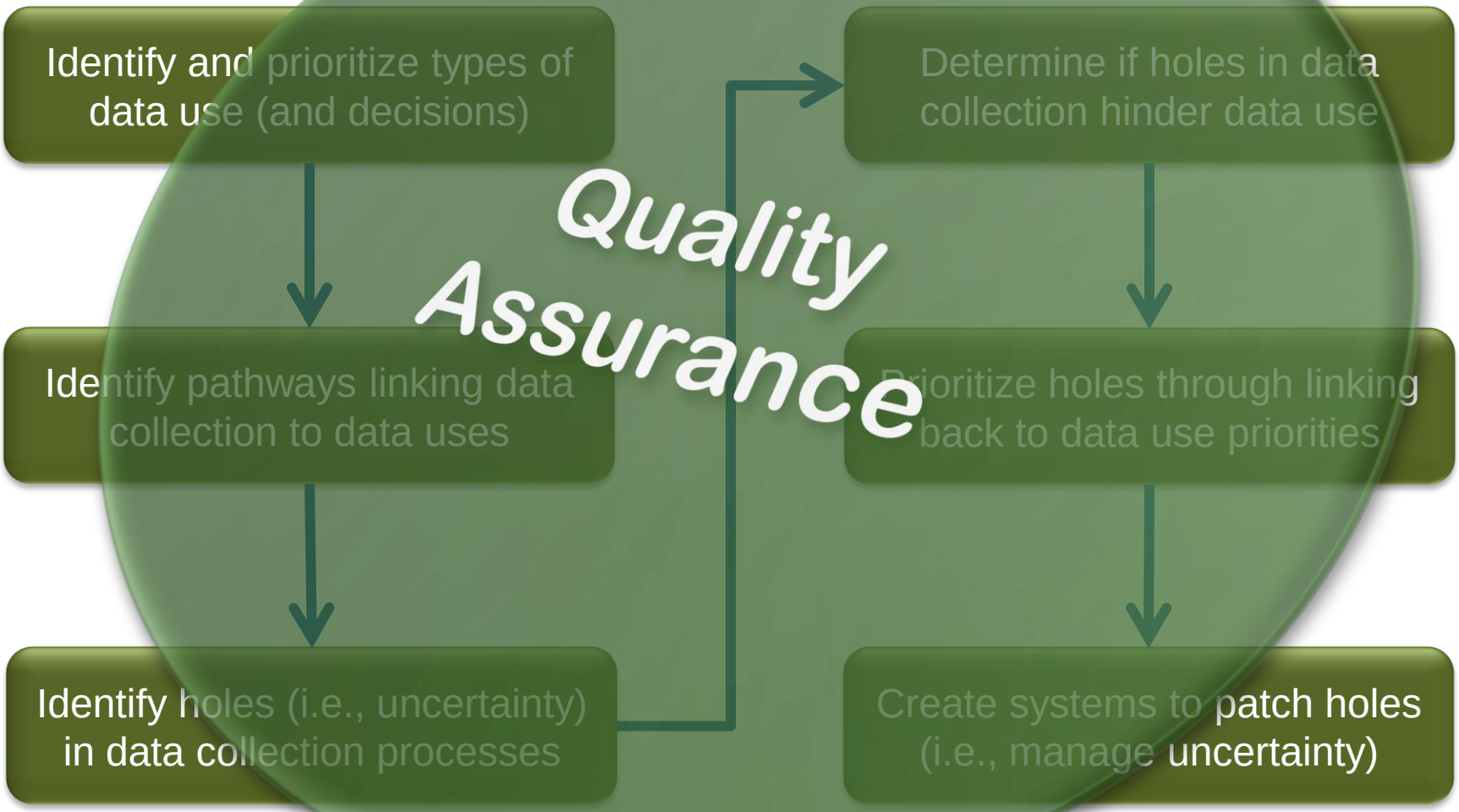
Managing Uncertainty



California's Systematic Approach

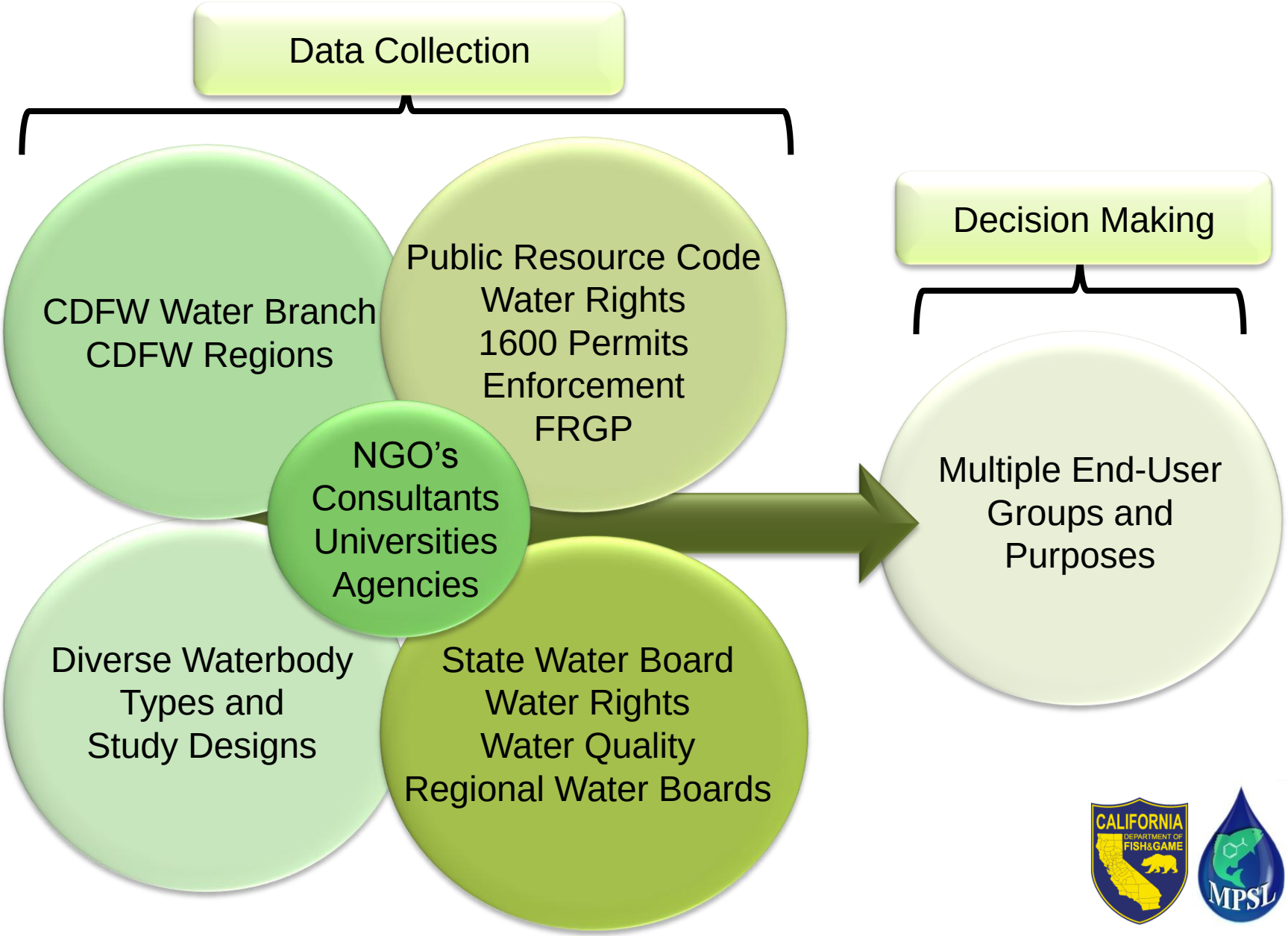


Policies and Decisions

- *Fish and Game Code §5937*
  - FERC (Federal Energy Regulatory Commission) relicense evaluations (involves flow management by and below dams)
- *Public Resources Code §10000-10005 [Stream Flow Protection Standards]*
  - Decisions made related to water allocation requests
- California Senate Bill X7-1 (2009)
  - Identify streamflow needs for Delta tributaries
- California Proposition 1 Water Bond (2014)
  - Includes funding activities to support enhanced streamflow for fish and wildlife. This is critical in our current drought situation.

Guidance on instream flow protocols and associated quality assurance will be important as this is a high priority and high profile effort. Transparency and accountability will be emphasized – and use of well-documented procedures and data quality will be essential.

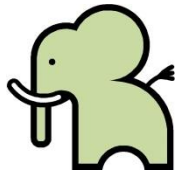
Department of Fish and Wildlife Water Branch Instream Flow Program



California's Challenges

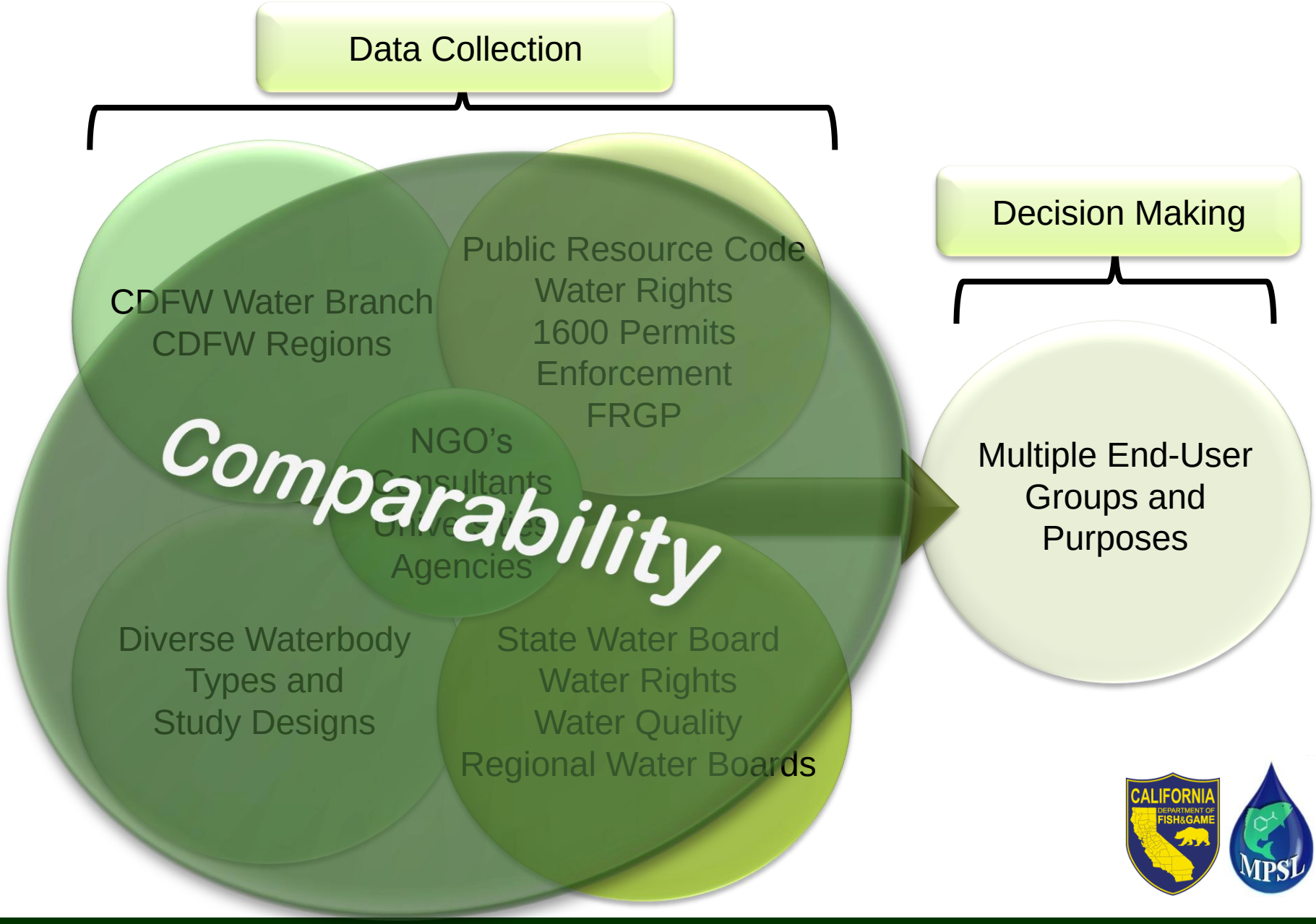
- One Size Does Not Fit All
  - Flexibility is required due to California's varied landscape, sheer geographical size, varied land uses, and water needs
- Limited Institutional Capacity
  - CDFW statewide flow program = 1 staff member
  - CDFW must leverage reports generated by others to be effective
- Documentation of Data Quality
  - Over $2M in reports recently submitted to CDFW with no consistency in documentation of data quality (defensibility)

Uncertainty



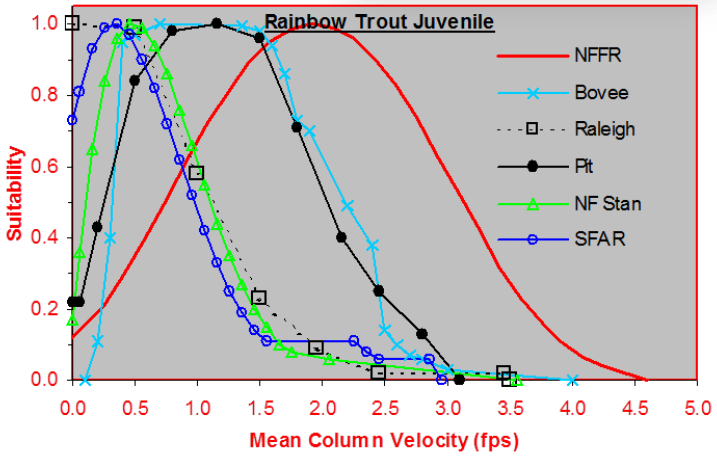
- CDFW receives outside study reports – often with little to no supporting documentation and/or missing critical information
  - Raw Data
  - Method Protocols
  - Model Calibration Reports

- No systematic quality review of studies
  - Is the study design appropriate to meet objectives?
  - Are the study sites representative?
  - How well did models calibrate?
  - Are models representative of flow vs. habitat relationships?
  - Are study data complete?
  - Are the methods and approach technically sound?
  - Are the findings, interpretations, and conclusions valid for making management decisions?


Data Collection
CDFW Water Branch
CDFW Regions
Public Resource Code
Water Rights
1600 Permits
Enforcement
FRGP
NGO's
Consultants
Universities
Agencies
Comparability
Diverse Waterbody
Types and
Study Designs
State Water Board
Water Rights
Water Quality
Regional Water Boards
Decision Making
Multiple End-User
Groups and
Purposes

Building Comparability

- Common Indicators
- Application of Appropriate Methods
- Quality Assurance Program
- Toolbox and Training
- Information Exchange Network



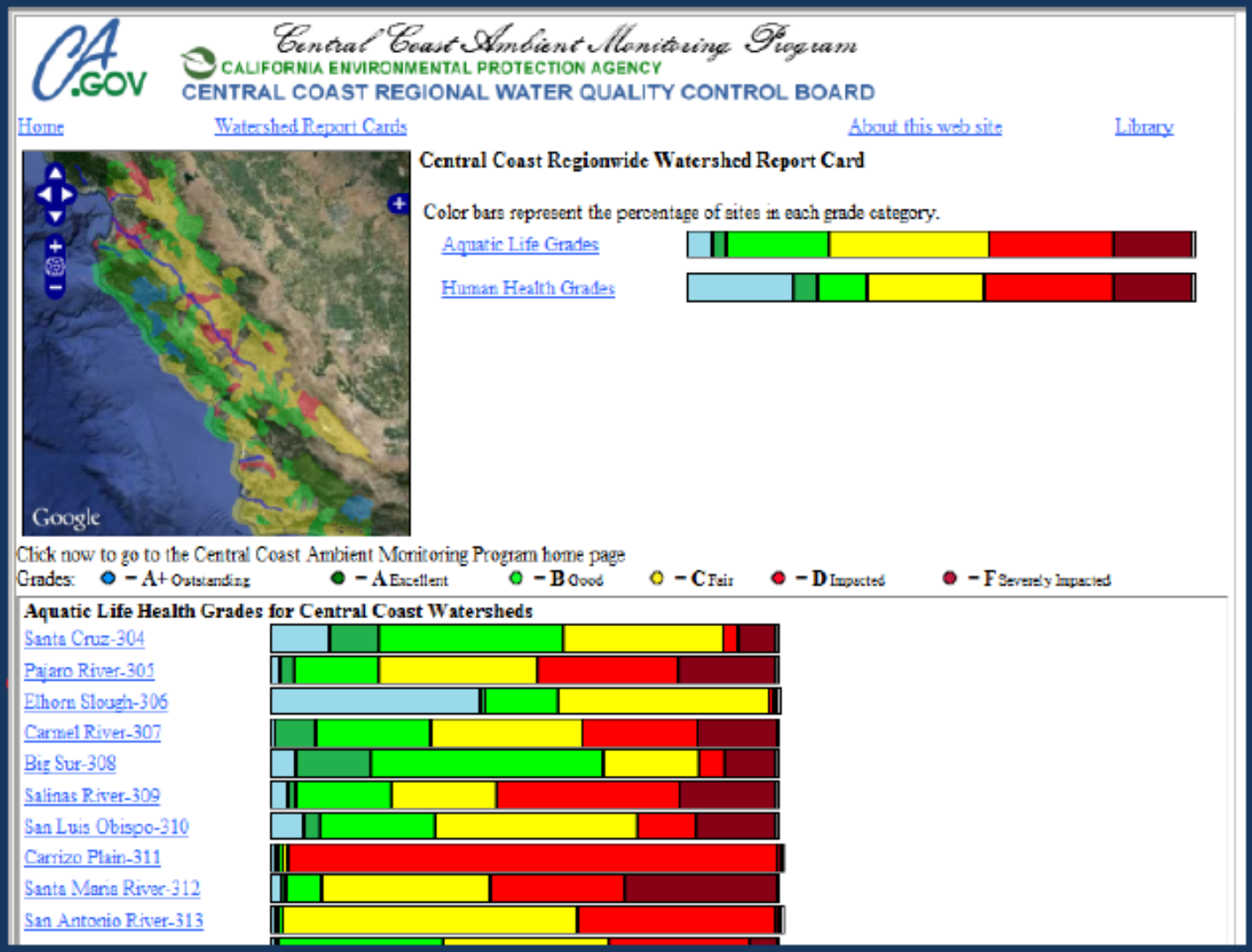
Goal: Collect, assess, and report in a consistent manner that allows flow data to be shared or combined with other flow information.

Comparability - Example

- CDFW collaboration with the State Water Resources Control Board (Central Coast Regional Water Quality Control Board)

- Sampling 20 priority steelhead streams in the region

- Goal: To develop a flow sub-index of aquatic life which can be aggregated, and integrated into the larger aquatic life index the State Water Resources Control Board already uses to assess condition, trends, and identify restoration priorities.

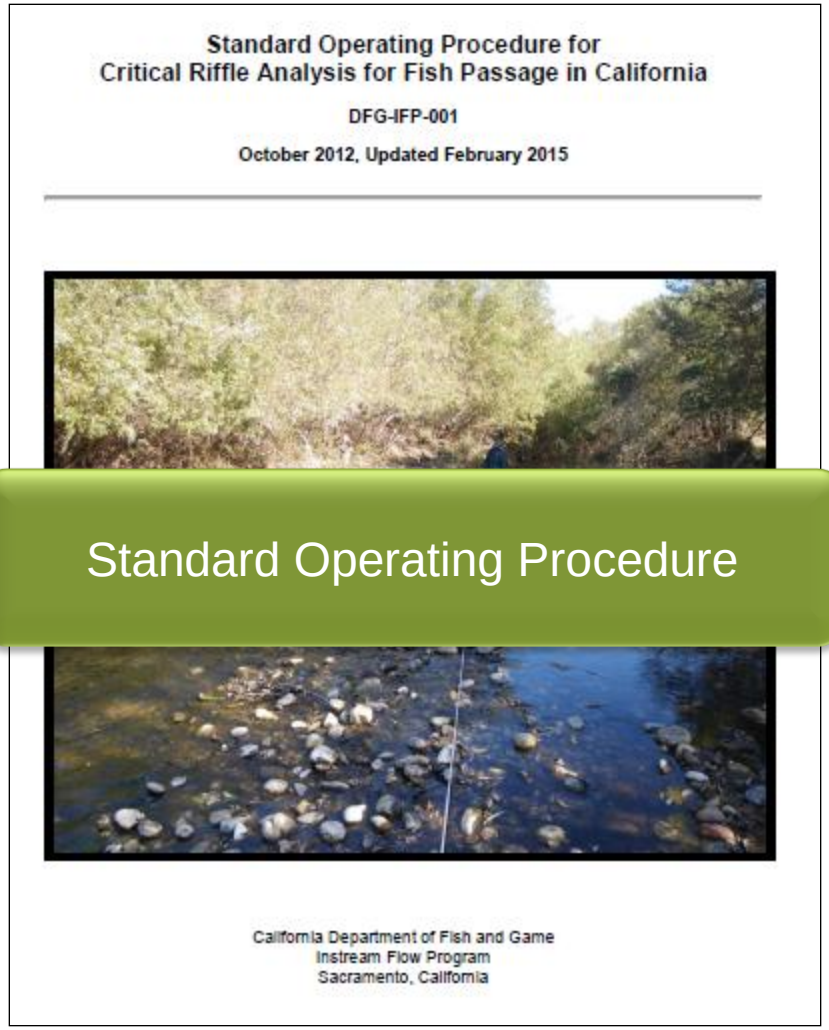


(not yet publically available)

The Toolbox

- Guidance Documents
- Standard Operating Procedures
- Fact Sheets
- Templates
- Training/Intercomparison Exercises
- Report Writing Guidance
- Report Review Checklists
- QA Manual
- Web Page

QA Program Tools



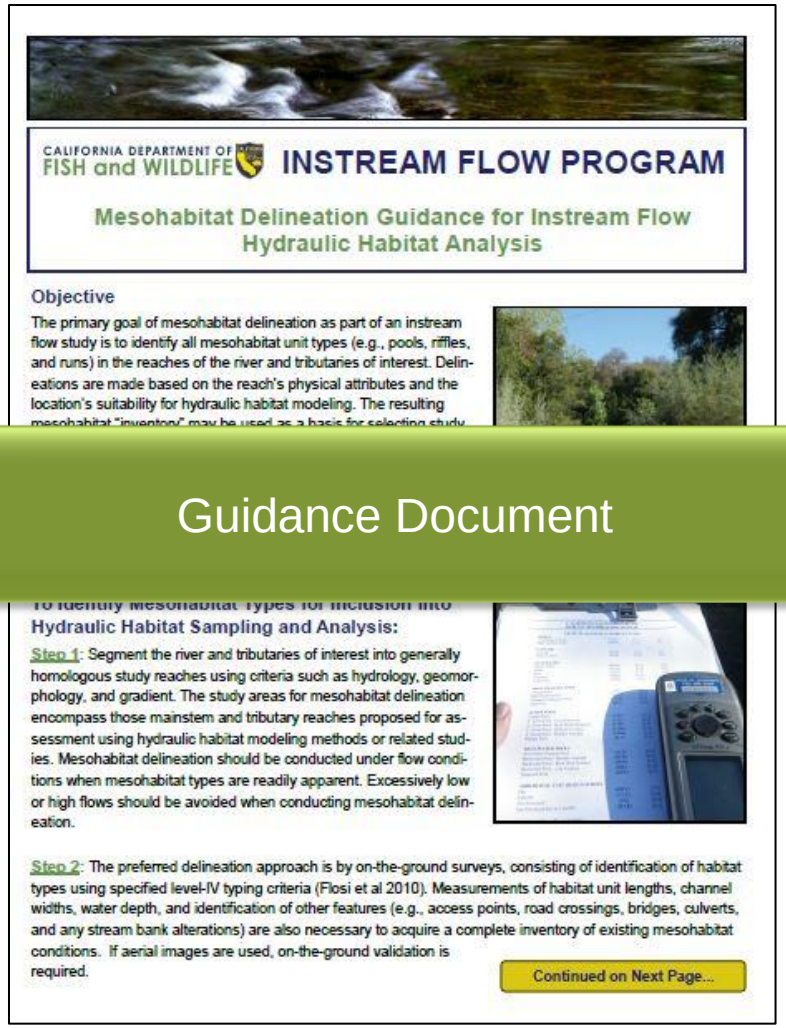
Standard Operating Procedure for
Critical Riffle Analysis for Fish Passage in California

DFG-IFP-001

October 2012, Updated February 2015

California Department of Fish and Game
Instream Flow Program
Sacramento, California

Standard Operating Procedure



CALIFORNIA DEPARTMENT OF FISH and WILDLIFE INSTREAM FLOW PROGRAM

Mesohabitat Delineation Guidance for Instream Flow
Hydraulic Habitat Analysis

Objective

The primary goal of mesohabitat delineation as part of an instream flow study is to identify all mesohabitat unit types (e.g., pools, riffles, and runs) in the reaches of the river and tributaries of interest. Delineations are made based on the reach's physical attributes and the location's suitability for hydraulic habitat modeling. The resulting

Hydraulic Habitat Sampling and Analysis:

Step 1: Segment the river and tributaries of interest into generally homologous study reaches using criteria such as hydrology, geomorphology, and gradient. The study areas for mesohabitat delineation encompass those mainstem and tributary reaches proposed for assessment using hydraulic habitat modeling methods or related studies. Mesohabitat delineation should be conducted under flow conditions when mesohabitat types are readily apparent. Excessively low or high flows should be avoided when conducting mesohabitat delineation.

Step 2: The preferred delineation approach is by on-the-ground surveys, consisting of identification of habitat types using specified level-IV typing criteria (Flosi et al 2010). Measurements of habitat unit lengths, channel widths, water depth, and identification of other features (e.g., access points, road crossings, bridges, culverts, and any stream bank alterations) are also necessary to acquire a complete inventory of existing mesohabitat conditions. If aerial images are used, on-the-ground validation is required.

Continued on Next Page...

Guidance Document

4. Project Design and Methodology

4.1 Study Design

This section describes and justifies the study design, including temporal and spatial scales. An effective design ensures that the type and quantity of data collected are sufficient to achieve study goals. Specifically, this section addresses:

- The study design, including temporal and spatial scales
- The rationale behind specific aspects of the study design
- The location and quantity of measurements to be taken to support statistical analyses or modeling
- The use of historical or pre-existing data

- Sample site parameters (i.e., what parameters will be measured at each site, how often, and why). Refer to blank field sheets in the Appendix.

4.3 Biology

4.3.1 Target Species and Life Stages

Identify target species and life stage(s) to be studied and describe the selection procedure. Important components to include are:

- Fish resources (e.g., target species occurrence, life stage characteristics, periodicity)
- Other species (game/nongame) of note or interest
- Procedural evaluation (if necessary)

4.3.2 Habitat Suitability and Biological Criteria

Briefly introduce and describe the importance of the habitat criteria. Identify and summarize the process for collecting site-specific criteria and/or identifying criteria from literature, as well as evaluating the transferability of criteria from other streams. Place this section before the modeling and empirical methods section (flow vs. habitat relationship) since it

5. Procedures and Protocols

5.1 Stream Survey and Habitat Mapping Procedures and Protocols

This section identifies and summarizes the procedures to be used for stream surveys and habitat mapping. In addition to a written summary of procedures, method information can be summarized in a table for quick reference.

Table X: Stream Survey and Habitat Mapping Procedures and Protocols

Method	Version#/Date	Author/Organization

Template

of procedures, method information can be summarized in a table for quick reference.

Table X: Field Data Collection Procedures and Protocols

Method	Version#/Date	Author/Organization

5.3 Modeling and Empirical Flow vs. Habitat Procedures and Protocols

This section identifies and summarizes:

- Hydraulic model(s) and empirical methods proposed for the study (may be presented in a table format)
- The appropriateness of the model(s) and methods to address study goal
- Calibration methods and procedures (i.e., bed roughness and transmissivity calibration procedures; model performance; identification of data outliers in calibrated models; selection of model simulation flows; bed surface development; mesh development; rating curve development; hydraulic calibration; simulation results).

CALIFORNIA DEPARTMENT OF FISH and WILDLIFE

INSTREAM FLOW PROGRAM

INSTREAM FLOW STUDY

RESULTS CHECKLIST

Review Checklist

internal or external sourc

ternal sources are an esse

limited resources. To ens

mation on which the CDF

checklist, as well as any o

- Site information
- Stream survey data
- Field instrument calibration data

☑ **Quality Assurance/Quality Control Results**

- Give complete quality control results
- Discuss whether stated quality objectives were met and why
- Discuss any corrective actions initiated during the course of the project, along with outcomes

☑ **Data Management and Reporting**

- Detail how and where project data are stored, and how they are available to data users
- Detail where the technical report results are stored, and how they are available to data users

Department of Fish and Wildlife Water Branch Instream Flow Program

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- Delta Mitigation and Restoration Programs
- Ecosystem Restoration Program
- Statewide Water Planning

CDFW Water Branch
830 S Street
Sacramento, CA 95811

Fax: (916) 445-1768
E-mail the Water Branch

E-mail the Water Branch Web Developer

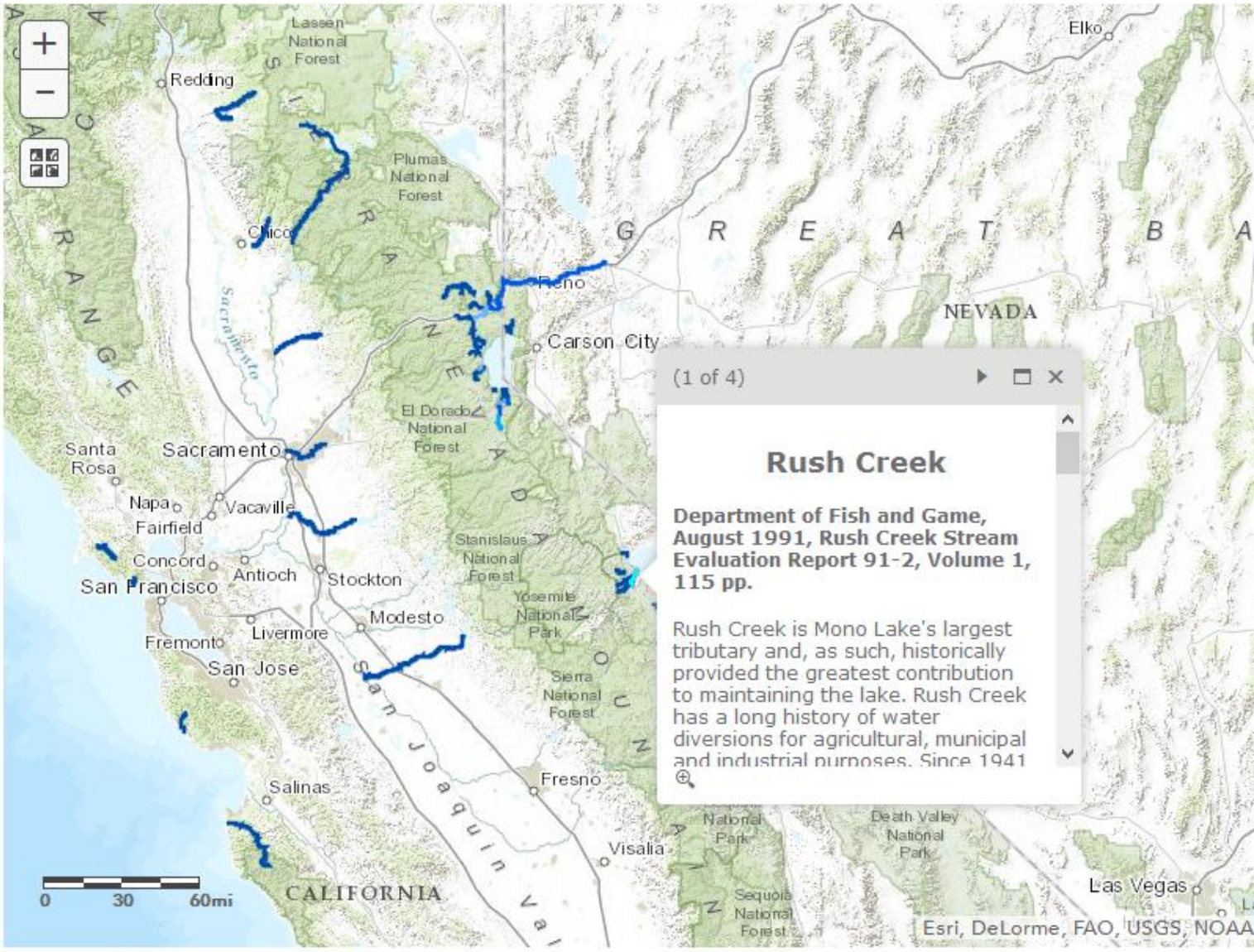
Water Branch Phone Directory

Water Branch Org Chart

Get ADOBE READER

Related Agencies

- Bureau of Reclamation
  - Refuge Water Supply
- Department of Water Resources
  - California Water Plan
  - Fish Passage Improvement Plan



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Rush Creek

Department of Fish and Game, August 1991, Rush Creek Stream Evaluation Report 91-2, Volume 1, 115 pp.

Rush Creek is Mono Lake's largest tributary and, as such, historically provided the greatest contribution to maintaining the lake. Rush Creek has a long history of water diversions for agricultural, municipal and industrial purposes. Since 1941 water was diverted and transferred out of the Rush Creek drainage to the Los Angeles metropolitan area for municipal and industrial uses. This resulted in the virtual desiccation of lower Rush Creek, degradation of riparian vegetation and elimination of trout populations.

In the early 1980s, wetter than average hydrologic conditions resulted in uncontrolled spills past Grant Lake dam into lower Rush Creek and the reestablishment of riparian and aquatic habitats. By the mid 1980s less wet conditions threatened to desiccate the stream again. A lawsuit was filed to require the Los Angeles Department of Water and Power to release sufficient water into lower Rush Creek to maintain the aquatic resources that had re-colonized the stream. The Mono County Superior Court of California granted a preliminary injunction and mandated that 19 cubic feet per second (cfs) be maintained in lower Rush Creek, pending trial. The court also requested DFG to participate in a cooperative investigation to identify the instream flow needs to maintain Rush Creek's fish population.

Based on an Instream Flow Incremental Methodology assessing habitat typing, hydrology, stream specific habitat suitability, Physical Habitat Simulations, fish populations and water temperature modeling, in 1991 DFG recommended the following instream flows as measured in cubic feet per second (cfs), be maintained in lower Rush Creek, Mono County:

	Dry water years	Normal water years	Wet water years
Month	Flow in cfs	Flow in cfs	Flow in cfs
Apr	35	59	84
May	75	100	100
Jun	72	100	100
Jul	45	100	100
Aug	42	93	100
Sep	40	69	100
Oct	36	58	93

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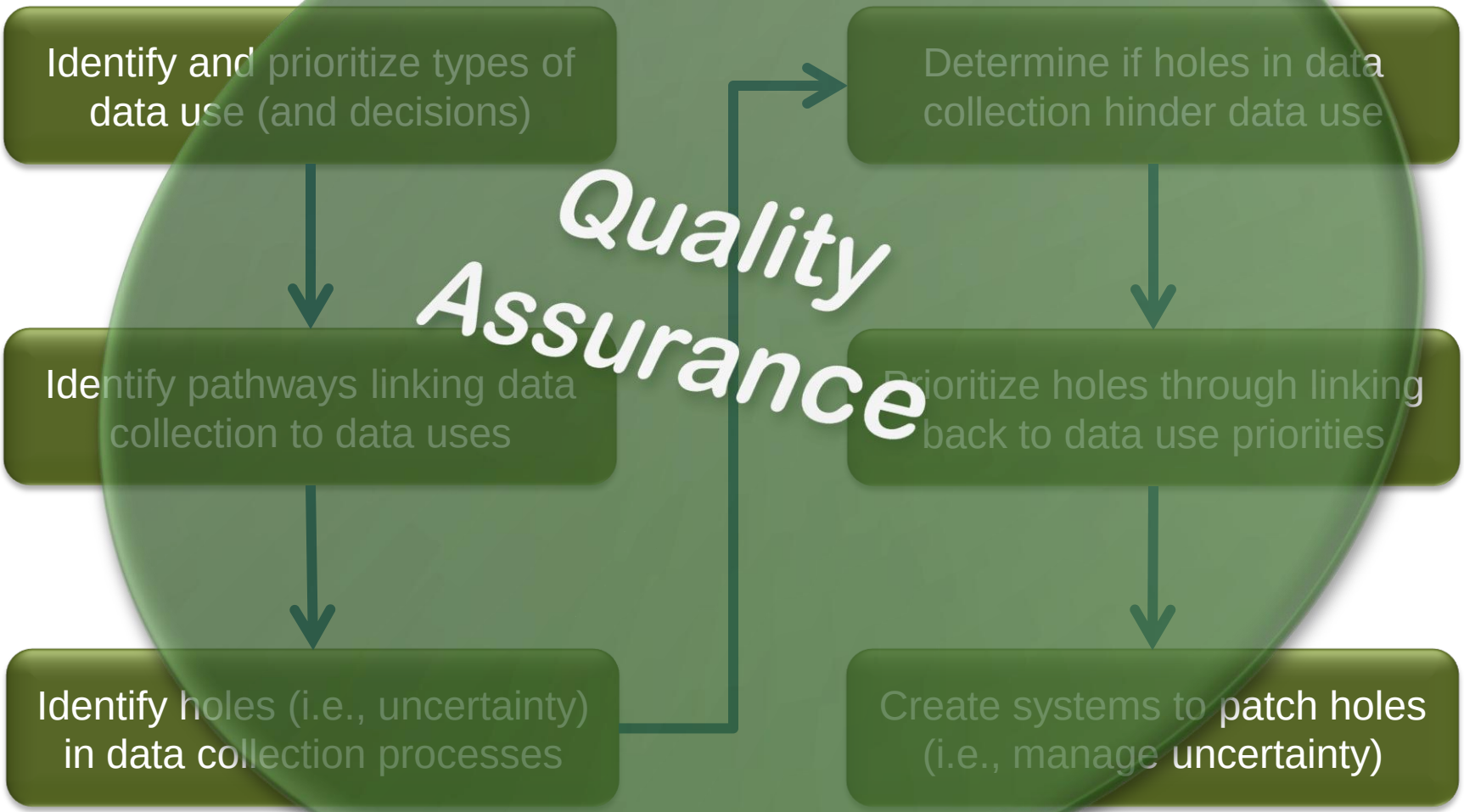

Homework

1. What are the types, and examples of, decision making in your State or Province?

2. How is your data collection linked to supporting information to make those decisions?

3. What are the holes (i.e., uncertainty) in your data collection?

4. Do the holes (i.e., uncertainty) pose a problem or risk to the intended levels of decision making in your State or Province?

5. Take action

Unknown + Undocumented = Unusable