

## Establishing Objectives for Fisheries Resource Monitoring Program Investigations

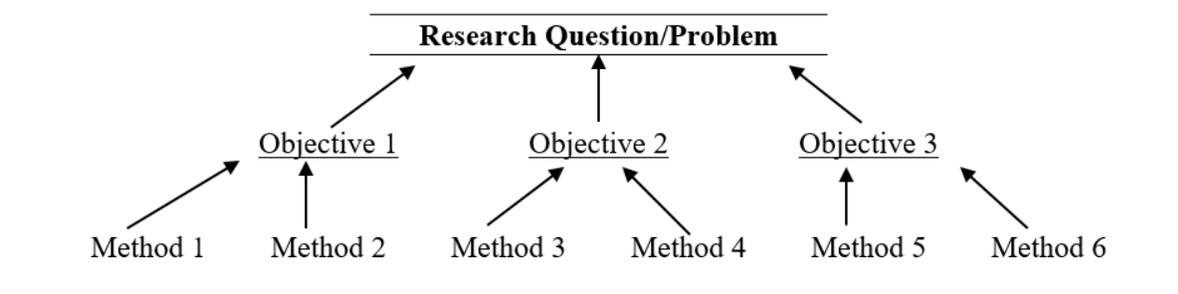
These guidelines are intended to provide direction and clarification for writing objectives for proposals and investigation plans in the Fisheries Resource Monitoring Program, whether with an emphasis in the stock status and trends or harvest monitoring and traditional ecological knowledge aspects of the program. Clear objectives are fundamental to the project design and provide the framework for evaluating project performance.

All research projects begin with a well-framed question (hypothesis), which is then broken down into one or more objectives that will help answer the question or solve the problem. Objectives should be clearly written using action verbs such as estimate, count, test, document, or identify. Objectives must be specific, measurable, and achievable. Objectives define the types of data to be obtained as well as the population from which data are drawn and are supposed to represent.

Whenever possible, objectives should use statistical criteria to describe or summarize data, to test inferences about the population or process studied, to predict the likelihood of an event occurring, or to state the probability of a hypothesis being correct. This level of rigor increases the potential for project success, and greatly increases the likelihood that results applied to management will benefit fishery resources and subsistence uses.

Finally, while objectives provide information on what will be accomplished within a given time period, they should not include descriptions of how this will be accomplished. Discrete, specific methods or tasks for accomplishing each objective should be described in the methods section. These methods should clearly articulate and demonstrate that they will yield the information needed to accomplish the research objectives.

The figure below illustrates how the methods and objectives relate to the research question or problem.



### Examples of research questions with associated sound objectives

- ◆ **Research question:** What is the abundance of adult Burbot in Long Lake?

*Appropriate objective:*

- Estimate the abundance of mature Burbot in Long Lake such that the estimate is within 10% of the actual abundance 95% of the time.

- ◆ **Research question:** What is the age composition of the Chinook Salmon escapement in the Salmon River?

*Appropriate objective:*

- Estimate the age composition of Chinook Salmon sampled from the Salmon River weir such that 95% confidence intervals of age composition will be within +/-10% ( $\alpha=0.05$ ,  $d=0.10$ ).

- ◆ **Research question:** What are the characteristics of the annual harvest of non-salmon fish in four communities for the year 2024?

*Appropriate objective:*

- Estimate harvests of non-salmon fish species by community by season for calendar year 2024.
- Estimate the percentage of households using, harvesting, receiving, and giving away non-salmon fish species for calendar year 2024.
- Compare household harvests and uses by community for calendar year 2024 with estimates for other recent years.

- ◆ **Research question:** What do long-term local residents of the Koyukuk River know about whitefish populations that have been customarily and traditionally harvested?

*Appropriate objectives:*

- Document TEK information on whitefish species, including:
  - species utilized and their local names;
  - biological information including habitat preferences, spawning and rearing areas, and seasonal movements;
  - traditional and contemporary harvest methods, including timing of harvest, gear used, mapping of harvest areas;
  - traditional and contemporary preparation and preservation methods;
  - fish-related place names.
- Assess the coverage of the information by species, geographic area, and topic.

- ◆ **Research question:** What factors have contributed to changes in subsistence salmon harvests in the Copper River Basin over the past century?

*Appropriate objectives:*

- Determine, using all available quantitative harvest data, if there has been a change over the last 125 years in the subsistence harvest of salmon by Federally qualified users in four communities.
- Hypothesize possible factors that explain observed changes in the subsistence harvests and test those explanations against quantitative measures, and, when possible, against interview data collected from residents of the study communities.

- ◆ **Research question:** What is the status of traditional ecological knowledge (TEK) projects funded under the Fisheries Resource Monitoring Program, and what needs to be accomplished to strengthen application of this data in management decision-making?

*Appropriate objectives:*

- Document and analyze the major methods utilized to collect TEK, and identify those with the greatest success.
- Develop a manual for applying qualitative information to management.
- Develop regional inventories of key informants and their particular knowledge specialty.

In summary, objectives must clearly relate to the research question or problem of the project. Each objective should identify a well-defined action, issue, or event to be accomplished within a specific time frame. All objectives must be specific, measurable, and achievable. Parameters to be measured must be identified, and statistical criteria and tests should be used where applicable. Once a set of clearly focused objectives have been developed, the appropriate methods for each objective should be relatively easy to determine. These methods are then described in the methods section.