U. S. FISH AND WILDLIFE SERVICE

National Wildlife Refuge System

Visitation Estimation Workbook

NATIONAL WILDLIFE REFUGE SYSTEM

Visitation Estimation Workbook

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US Fish and Wildlife Service
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Executive Summary

The *Visitation Estimation Workbook* is intended for Service employees charged with estimating and reporting visitor numbers on refuges and wetland management districts. There are two ways to use the *Workbook*: to design an appropriate plan for estimating and reporting visitor numbers and to identify the best methods currently available to implement that plan. Chapter 1 discusses basic estimation concepts and briefly describes seven standard methods for collecting data. Chapter 2 walks you through the steps in developing an estimation plan for refuges that are primarily accessible by road. Chapter 3 shows you how to plan for visitation estimation on refuges that are remote or are not primarily reached by road. Appendices A and B contain useful reference information and tools to help you in the planning and estimation process.

The *Workbook* provides the essential information for visitation estimation. To learn more about how to implement the estimation methods discussed in the *Workbook*, consult the *Visitation Estimation Technical Supplements*. Each *Technical Supplement* contains a detailed technical presentation of a different estimation method and case studies from refuges actually using that method. The *Technical Supplements* are available from the Visitor Services chief in your Regional Office, in Adobe Portable Document Format (PDF).

The contents of the *Workbook* and the *Technical Supplements* are summarized on the next page.

Quick Reference Guide

Visitation Estimation Workbook
Chapter 1 – Introduction and Basic Concepts The first chapter provides background information. Some important terminology is introduced and a general approach to estimating visitor numbers is presented as a framework for the methods described in the *Workbook*. This general approach is tied directly to Goal 5 of the Annual Performance Plan (1.1.3).
Chapter 2 – Estimating Visitor Numbers on Refuges with Roads The second chapter is intended for refuges where visitor activities are reached by road and occur primarily within designated areas.
Chapter 3 – Estimating Visitor Numbers on Remote or Roadless Refuges This chapter discusses methods of estimating visitor numbers when: visitor activities occur primarily in an unconfined setting; recreational and educational opportunities are very numerous or widely separated; or the primary access to the refuge is not by vehicle.
Appendix A – Estimation Methods for Specific Settings A list of recommended methods for estimating visitor numbers in typical refuge settings and for specific activities occurring within the Refuge System.
Appendix B – Visitation Estimation Planning Template A template is presented for a Visitation Estimation Plan, including: a planning checklist, an example of a cover page, and worksheets for documenting data, methods, and formulas.

Technical Supplements	Applications
T - 1 **Direct Observation**	- environmental education or interpretation program - entrance road - parking area - visitor center - kiosks/blinds/tower - trail head
T - 2 **Traffic Meters**	- road - parking area - walking or biking trail - doorway
T - 3 **Patrols**	- parking area - boat launch - hunting or fishing area - Waterfowl Production Area
T - 4 **Self-Registration**	- visitor center - trail heads - boat launches
T - 5 **Fee Stations**	- entrance booth - self-pay station (“iron ranger”)
T - 6 **Surveys**	- Visitor Satisfaction Survey - return-mail survey - drop-box survey
T - 7 **Analysis of Data**	- numerical and statistical analysis of raw data collected in the field - use of spreadsheet software to process the raw data and generate reports

Introduction and Basic Concepts

Chapter 1

A Foundation for Visitation Estimation in the National Wildlife Refuge System

1.1 Purpose and Need

1.1.1 Purpose of the Workbook

The purpose of the *Visitation Estimation Workbook* (*Workbook*) is to assist refuge managers and their staff in planning, implementing and evaluating programs for estimating visitor numbers in the National Wildlife Refuge System (Refuge System). The *Workbook* describes standard methods for estimating visitor numbers on refuges and waterfowl production areas. The great diversity of the Refuge System makes it impossible to design a single method suitable for every station; consequently, the *Workbook* also provides a framework for adapting the methods to meet the needs of an individual station.

1.1.2 Need for the Workbook

In *Fulfilling the Promise*, Recommendation P2 (Update the National Public Use Requirements), the U. S. Fish and Wildlife Service (Service) promised to make the reporting of public use consistent and accurate. At least three specific needs were identified for accurate data about the number of visitors: (1) to **evaluate** existing levels of service to the public; (2) to **document** results of public use programs; and (3) to **demonstrate** accomplishments to Congress and the American people.

Fulfilling the Promise

(1) Evaluate existing levels of service
(2) Document results of public use programs
(3) Demonstrate accomplishments

Busy schedules often limit the amount of time that can be spent on visitation estimation. However, reliable data about visitor numbers can provide a powerful tool for assessing current visitor services programs and projecting future requirements. The data can also provide a numerical basis for budget estimates and resource management evaluations. Without such information, comprehensive planning is severely handicapped. Finally, accurate data about visitors' activities can assist in public relations. Many refuge managers report that members of the public, the news media, and public officials at all levels of government frequently ask very specific questions about visitor participation in particular recreational activities.

1.1.3 Relationship to the Annual Performance Plan

The Annual Performance Plan (APP) is a tool for measuring the performance of the Refuge System. The information collected in the APP replaces the Refuge Comprehensive Accomplishment Report (RCAR) and the Visitor Use Reports, so refuges no longer have to complete those two reports.

Goal 5 of the Refuge System Annual Performance Plan is to "Provide Quality Wildlife-Dependent Recreation and Education Opportunities." Under Goal 5, field stations are asked to report the total number of visitors to the station, the number of visits for the six priority wildlife-dependent visitor uses (hunting, fishing, wildlife observation, photography, environmental education, interpretation), and the number of visits for other compatible refuge uses. (See Table 1.1 for a list of the public education and recreation activities that can be reported under Goal 5 for FY 2005 – 2006.) The methods described in this *Workbook* are appropriate for collecting estimates of visitor numbers to report for the performance measures under Goal 5.

Table 1.1 List of educational and recreational activities that can be used as performance measures for Goal 5 of the Refuge System Annual Performance Plan. All items can be estimated using methods described in this *Workbook*. Reference numbers refer to sections of the Annual Performance Plan.

Ref#	Measure
	Overall Visitation
5.04	Total number of visitors
5.05	Number of special events hosted on site
5.06	Participants at special events hosted on site
5.07	Number of visitors to Visitor Center or Visitor Contact Station
	Hunting
5.10	Total hunting visits
5.11	Waterfowl hunt visits
5.12	Other migratory bird hunt visits
5.13	Upland game hunt visits
5.14	Big game hunt visits
	Fishing
5.17	Total fishing visits
5.18	Freshwater fishing visits
5.19	Saltwater fishing visits
5.20	Estuarine fishing visits
	Wildlife Observation
5.23	Total wildlife observation visits
5.24	Foot trail visits
5.25	Auto tour visits
5.26	Boat trail/launch visits
	Wildlife Photography
5.29	Total wildlife photography participants
5.30	Photo blind visits
5.31	Other photography location visits
	Environmental Education
5.34	Total environmental education participants
5.35	Number of teachers participating in on-site programs
5.36	Number of teachers participating in off-site programs
5.37	Number of students participating in on-site programs
5.38	Number of students participating in off-site programs
	Interpretation Program
5.41	Total interpretation participants
5.42	Number of participants in on-site talks/programs led by NWRS staff or volunteers
5.43	Number of participants in off-site talks/programs led by NWRS staff or volunteers
	Other on-site recreational uses offered
5.45	Total visits
5.46	Trapping visits
5.47	Bicycling visits
5.48	Camping visits
5.49	Swimming visits
5.50	Motorized travel by boat (non-wildlife dependent) visits
5.51	Non-motorized travel by boat (non-wildlife dependent) visits
5.52	Other recreational visits

1.2 Basic Concepts of Visitation Estimation

1.2.1 Important Terminology

1.2.1(a) Activity

An **activity** is any legal use of a refuge or waterfowl production area that is related to the mission and goals of the Refuge System or to the specific purpose(s) of one of the components of the System. The 1997 Refuge System Improvement Acts defined six priority visitor uses of the National Wildlife Refuges: wildlife observation, environmental education, interpretation, photography, hunting, and fishing. Each of these uses is an activity. Individual refuges have defined other compatible visitor uses that also qualify as activities. Within general categories such as "wildlife observation," activities can be specific, such as "driving on a wildlife tour route."

1.2.1(a) Station, Area, and Facility

Individual refuges and wetland management districts are referred to as **field stations**, or simply "stations," within the National Wildlife Refuge System. A particular station may be composed of several physically distinct visitor use **areas**. As an example, a wetland management district is composed of several distinct waterfowl production areas (WPAs). Each WPA is a distinct visitor use area within the wetland management district. Some refuges also have designated "day use areas" where multiple visitor activities are provided, such as hiking, fishing, and wildlife observation. A **facility** is a structure or improvement that has been provided to encourage or manage one or more visitor activities. Examples of facilities include observation towers, interpretive trails, boat ramps, and accessible fishing piers.

1.2.1(c) Visitor

A **visitor** is someone who comes to the station, or to a visitor center/environmental education facility operated by the Service that is not on the station, and participates in at least one of the activities listed under Goal 5 of the Annual Performance Plan questionnaire (Table 1.1). These activities include visits to contact stations and visitor centers, priority wildlife-dependent visitor uses, and other appropriate and compatible recreational activities. There are three important points to keep in mind about the definition of a visitor:

- The total number of visitors to a station on a given day does not measure how long they stayed. A visitor who stays for fifteen minutes is counted the same as a visitor who stays the entire day. Conversely, refuges permitting camping or other overnight activities should count an individual camping for three days on the refuge as three visitors.

- The total number of visitors counted should not include Service employees, volunteers, researchers, contractors, or special use permit holders.

- Visitors do not include individuals on the way to a non-refuge location who pass through the refuge without stopping to participate in an activity. Usually these individuals are on interstate highways, state roads, county roads, or on navigable waterways not under the control of the Service. It would, however, be legitimate to count visitors who pull off the highway and stop at a refuge kiosk, overlook, observation tower, or designated pull-out, or who beach their boat and camp on refuge land.

1.2.1(d) Visit

A **visit** is defined as the entry of one person onto a Refuge System station to engage in one recreational or educational activity. It is important to remember that **a visit is not the same as a visitor.** This distinction can be a source of confusion in visitation estimation; one visitor could account for several visits to the station in a single day, simply by participating in several different activities. One way to avoid confusion is to picture visitors entering through an imaginary turnstile with a recording counter on it. The total number of visitors would be the number tallied on the recorder at the end of the day.

On the other hand, after visitors have entered the refuge boundary, they will usually participate in different activities. Figure 1.1 is a hypothetical representation of a refuge that has a visitor center, a wildlife tour road, and a designated hunting area. Suppose that a refuge employee or volunteer counts or estimates the number of people who stop at the visitor center, drive on the wildlife tour road, and hunt. The counts of the numbers of visitors who participated in each of the activities during the year represent the visits for those activities. **The combined number of visits for all educational and recreational visits is almost always greater than the total number of visitors for the same period.**

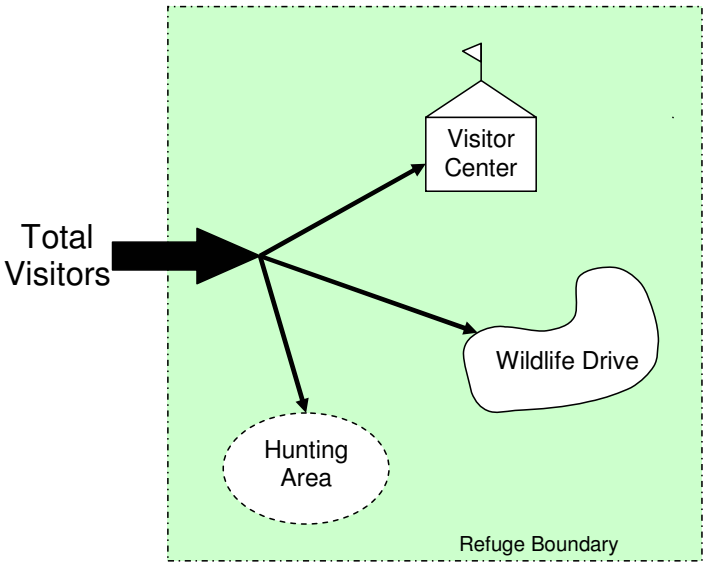


Figure 1.1 Hypothetical case of a refuge providing three different educational or recreational opportunities to visitors: visitor center, wildlife tour road, and hunting.

1.2.2 Overview of the Process for Estimating Visitor Numbers

On refuges with one or two entrances that can easily be monitored, it is possible to directly estimate the total number of **visitors.** However, in many cases it is easier to estimate the number of **visits** for specific activities; from the number of visits, the total number of visitors can be calculated using an estimation formula. These vital statistics – total visitors and number of visits for specific activities – are related to each other through the concept of the activity ratio.

1.2.2(a) Definition of Activity Ratio

The **activity ratio** for one activity equals the fraction or proportion of visitors who participated in that activity. Remember that the total number of visits for one activity is really the same thing as the number of visitors who participated in that activity.

$$\text{Activity ratio} = \frac{\text{Number of visits for the activity}}{\text{Total number of visitors}}$$

Three key points apply to the concept of activity ratios:

- The number of visits for the activity and the total number of station visitors must be measured during the same period of time, but the duration of the measurement period can be anywhere from several hours to an entire year, depending on how the data are collected.

- The activity ratio for **one activity** is a decimal value less than or equal to 1.00. If all visitors participate in a certain activity, then the activity ratio will be exactly 1.00 for that activity.

- The **sum** of all activity ratios is usually greater than 1.00, because one person usually participates in more than one activity during a single visit. (The sum of the activity ratios is really just the average number of activities for one visitor.)

1.2.2(b) Example of Activity Ratio Concept

As an example, suppose that for a one-year period a refuge reports 80,000 total visitors, 40,000 visits to the visitor center, 60,000 visits to the wildlife drive, and 20,000 hunting visits (Table 1.2, next page).

The activity ratio for the visitor center is 40,000 visits divided by 80,000 total visitors in the same time period; the ratio equals 0.50 (right).

Example: visits to the visitor center
Activity ratio = 0.5

$$\text{Activity ratio} = \frac{40{,}000 \text{ visits}}{80{,}000 \text{ total visitors}}$$

For the wildlife tour road, the activity ratio is 0.75, and for hunting, the activity ratio is 0.25. The total number of visits for all activities is 120,000, a number well above the total number of visitors reported because many visitors participated in more than one activity.

Total Number of Visitors	80,000	
Specific Activities	**Number of Participants**	**Activity Ratio**
Stopped at Visitor Center	40,000	0.50
Drove Wildlife Tour Road	60,000	0.75
Hunted on the Refuge	20,000	0.25
Total for All Activities	**120,000**	

Table 1.2 Example of calculating activity ratios for the station represented schematically in Figure 1.1. Activity ratios are calculated from the estimated number of visitors participating in specific activities and the total number of visitors to the station during the same period of time.

1.2.3 Three Principles of Estimation

Whether estimating visitation on a remote refuge, a wetland management district, or on a refuge reached by road, there are three principles to keep in mind.

- Some amount of time, effort and expense is always required to estimate visitor numbers.
- There is no method of counting visitors that is 100% accurate. Therefore, all reports of visitor numbers are estimates only.
- Significant improvements in the accuracy of an estimate can often be made with relatively minor changes in the methods being used.

The hypothetical example of the refuge in Figure 1.1 can be expanded to illustrate these principles. Recall that in the scenario three opportunities are provided for visitors: a visitor center, a wildlife auto tour, and hunting. Suppose that the number of people coming through the door of the visitor center is hand-tallied by a Service employee or volunteer at the front desk. Also, suppose there is a vehicle traffic counter at the entrance of the wildlife auto tour road. Finally, imagine that hunters are required to leave their vehicles in established parking areas and walk into designated areas where hunting is permitted. During the hunting season, refuge law enforcement personnel perform daily field checks for licenses and limits, during which time they often make note of the number of cars in the parking areas.

The first estimation principle was that some amount of time, effort, and expense is always required to estimate visitor numbers. The traffic counter, for example, must be maintained

and the data must be regularly read or downloaded; someone has to visit the traffic counter at least once per month to record the vehicle tally and check the operation of the device; then the data must be converted to an actual number of visitors. Whoever is monitoring the visitor center must take a moment to record the tally of visitors who enter the door.

The second principle is that there is no method of counting visitors that is 100% accurate. The report of the number of people coming to the visitor center will probably be very accurate because they are counted and tallied, but some visitors will still be missed. Depending on its quality, the traffic counter will also provide an accurate count of the number of **vehicles** on the tour road, but the accuracy of the number of **visitors** reported depends on the multiplier used for the number of persons per vehicle. The number of hunters is probably the least reliable estimate because it is not systematically collected.

Finally, the third principle states that significant improvements in the accuracy of an estimate can often be made with relatively minor changes in the methods. For example, suppose the manager in this scenario would like a more accurate estimate of the number of people using the auto tour route. One approach would be to enlist volunteers to conduct direct counts of the number of people observed in visitors' vehicles. The counts would be conducted at different times of the year, for intervals of four hours. The results of the sample counts would be used to determine a reliable average value for the number of persons per vehicle and a margin of error for the estimate of the number of visitors using the tour road.

The estimate of hunter numbers can also be improved in the example. Since the law enforcement officers are already collecting data, one simple change that would improve the quality of the estimate would be to provide the officers with a standard form to record the day, time, and locations of vehicle counts. The completed forms could be submitted to the person responsible for calculating estimates of visitor numbers. A formula could then be designed to extrapolate the total number of hunters from the vehicle counts already being collected by the law enforcement officers.

When designing, implementing, or modifying a visitation estimation plan, remembering these three principles can lead to consistent improvements in the quality and reliability of the plan over time.

1.3 Standard Methods for Estimating Visitor Numbers

There are seven standard methods of data collection suitable for use on refuges and wetland management districts. One or all of these may actually be implemented on any particular station. This section includes only a brief description of each method and some discussion of the advantages and disadvantages of each. For more information, including case studies, consult the *Technical Supplements*. These documents are available from the Visitor Services chief in your Regional Office, in Adobe Portable Document Format (PDF).

STANDARD METHODS

(1) Direct observation
(2) Traffic counters
(3) Patrols
(4) Self-registration
(5) Fees and permits
(6) Indirect estimation
(7) Surveys

1.3.1 Direct Observation

Direct observation means that the visitor is monitored visually or by video camera. One very common method of direct observation is to have a receptionist, volunteer, or staff member use a hand-held counter to tally each visitor who enters a visitor center or contact station. Direct observation is also used to calibrate traffic counters, determine activity ratios, and count the number of participants in programs. Obviously, direct observation can provide highly accurate counts, but can also be time-consuming. Direct observation in the field is indispensable when it is incorporated as a periodic supplement to other counting methods in order to obtain estimates of critical multipliers (such as the number of persons per vehicle) or activity ratios.

For more information about methods and applications of direct observation, see *Technical Supplement T – 1.*

1.3.2 Traffic Meters

Traffic meters (often referred to as traffic counters) are devices placed on highways, on trails, or in doorways to detect and record the passage of vehicles, bicycles, or pedestrians. Traffic meters, in many cases, are the most cost-effective method of acquiring large amounts of visitation data on the typical refuges in Regions 1-6. Chapter 2, which presents a plan for visitation estimation on refuges with roads, assumes that at least one traffic meter will be operated on each refuge, either on an entrance road or at an important visitor services area. Despite their advantages, traffic meters require an initial expenditure of funds for equipment, continuing maintenance and monitoring, and at least some direct observations of visitors in order to calibrate the devices.

For more information about methods and applications of traffic counting devices, see *Technical Supplement T – 2.*

1.3.3 Patrol

In the patrol method, a refuge employee or volunteer walks, drives, or takes a boat to specific locations where visitors participate in recreational or educational activities. Typical locations for patrols include boat ramps, parking lots, and fishing areas. Patrols are the recommended method for use on wetland management districts. The purpose of a patrol is to observe a sample of visitors, vehicles, or boats at visitor use areas and extrapolate an estimate of the total number of visitors using those areas. Patrols can be specifically scheduled for this purpose, or they may be collateral to other duties, such as law enforcement patrols during hunting season. The greatest drawback to the patrol method is that it is time-consuming, but for refuges that have too many areas to monitor with traffic counters, patrols may be the best solution.

For further information about patrol methods and their applications, see *Technical Supplement T – 3*.

1.3.4 Self-registration

Applications of this method include: guest books at visitor centers, trail registers, and voluntary permits for hunters or anglers. The respondent may be asked to indicate the number of persons in the party, the types of activities selected, and the length of his or her stay. Information about the types of activities selected is particularly helpful because it can be used to estimate activity ratios. Self-registration tools are inexpensive and may be the only feasible methods at remote trailheads or parking areas. However, accuracy of the counts is always limited by uncertainty about the degree of compliance. Many visitors do not bother to register. Repeat visitors and local residents are highly unlikely to register each time they visit.

Additional information about methods and applications of self-registration can be found in *Technical Supplement T – 4*.

1.3.5 Entrance Fee Stations and Permits

Entrance fees may be collected at a staffed entrance station, a visitor center, or a self-pay station such as an "iron ranger." Examples of user permits, both with and without fees, include campground registration, permits for river access, and hunting permits (such as those assigned by lottery for specific areas). User permits can be very accurate sources of information for particular activities, such as boating or hunting, especially if the refuge devotes sufficient time to permit checks and enforcement. Entrance fees are also a valuable source of data regarding trends in the number of visitors, but they do not provide complete information about the number of visitors unless there is a staffed fee booth where all visitors must stop before entering the refuge. The entrance fees collected at a self-pay station usually can not be used to estimate the total number of visitors to a refuge.

For more information about methods of collecting data at fee booths and self-pay stations, and applications of that data, see *Technical Supplement T –5*.

1.3.6 Surveys

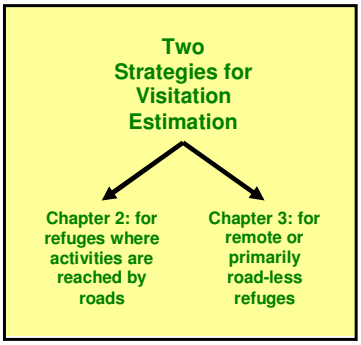
Surveys include mail-back questionnaires placed on windshields; traffic-stop surveys conducted by volunteers, contractors or staff; contracted telephone or mail surveys; and hunter reports at check-in stations. Surveys are very accurate if properly conducted. They can provide a wealth of information about the number of persons per vehicle, the type of activity in which each party participates, and even marketing data, such as demographics and activity preferences. However, surveys performed by contractors are expensive. One additional complication is that visitor surveys must be approved through a formal procedure requiring significant advance notice.

For a discussion of methods and applications of surveys, see *Technical Supplement T – 6*.

1.3.7 Indirect Estimation based on Professional Judgment

This method includes two types of estimation: (1) extrapolating the total number of visitors to the refuge or the number participating in a specific activity, using a very small sample of visitors and (2) estimating visitor numbers based on an assumption about the visitors' behavior. This is the least accurate method of visitation estimation, but there are cases where no other method is practical, especially for remote and roadless refuges. The manager who uses these methods should strive to make the most reasonable estimates possible and document the logical reasons for the estimates.

1.4 Two Strategies for Estimating Visitor Numbers



Now that you have read or reviewed the basic information about visitation estimation, the next step is to design a visitation estimation plan for your station, or review the plan if it already exists. There are two strategies used in the *Workbook* for estimating the number of visitors, one strategy for refuges that have roads and another for refuges that are remote or roadless.

For refuges where visitors enter primarily by road, it is possible to directly estimate the total number of visitors, when one of the following conditions is true: (1) there is one main entrance road that can be monitored (Chincoteague, Boyer Chute); (2) there are many different entrances, but the recreation opportunities are reached by roadways or are located at developed sites (St. Marks, Minnesota Valley, DeSoto); or (3) most visits involve participation in closely monitored activities (river floating at Fort Niobrara). In most instances, access in these three types of setting will be by vehicle, although for refuges in populated locations, access by foot or bicycle may be important. **The steps that should be followed to estimate the number of visitors to refuges with roads will be presented in Chapter 2.**

By contrast, for areas that or remote or roadless it is more difficult to directly estimate the number of visitors because: (1) the recreational activities are located in remote areas that are difficult for Service employees to efficiently reach (refuges like C.M. Russell and Sheldon); (2) recreational opportunities are very numerous and widely separated (typical of wetland management districts); or (3) the primary access to the refuge is not by vehicle (Region 7, Mississippi Valley) including refuges where access is gained to rivers, lakes, or impoundments within the Refuge System boundaries, either from non-refuge boat launches or from open waterways. For remote or roadless refuges, it is usually necessary to estimate the number of visits for specific activities and build a formula to calculate the total number of visitors from the estimated visits. **The steps necessary for estimating the number of visitors to remote or roadless refuges are outlined in Chapter 3.**

Go to Chapter 2 or Chapter 3, depending on which best fits your needs. If you are still not sure which strategy best matches the conditions on your refuge or wetland management district, there is a short summary of the steps in strategy at the beginning of each chapter.

Estimation on Refuges with Roads

Chapter 2

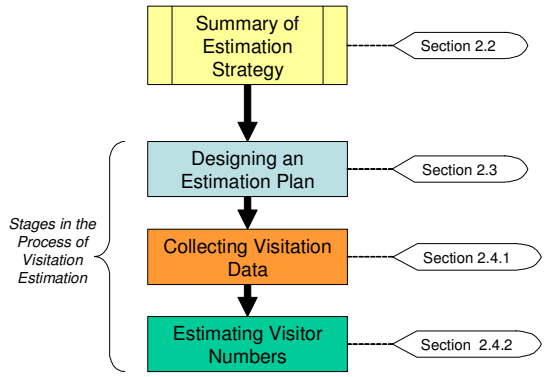
Step By Step Instructions for Estimating Visitor Numbers on Refuges Where the Primary Access Is By Road

2.1 Overview

Chapter 2 is intended for refuges where educational and recreational activities are reached primarily by road and where the visitor activities are generally confined within designated areas. The methods in this chapter do not apply to most wetland management districts, most of the refuges in Region 7, and some of the larger or more remote refuges in Regions 1-6. Managers of those wetland management districts and refuges should turn to Chapter 3.

The organization of Chapter 2 reflects the three stages of the estimation process: developing an estimation plan, collecting visitation data, and calculating visitation estimates. For each of the three stages, there is a list of steps to follow. Flow charts, located at the end of the chapter, are linked to the steps by color-coded symbols in the margin of the text. The listed steps and the flow charts will guide you through the complete process of estimating the number of visitors participating in educational or recreational activities at your station; you may find it helpful to have a copy of the flow charts handy while you read Sections 2.3 and 2.4.

Organization of Chapter 2



If your station already has a plan in place for estimating visitor numbers, you may wish to review the plan to:

- Identify needed modifications in the estimation plan.
- Determine whether the methods you are using are consistent with the visitation at your station.
- Determine the reliability of your methods and the accuracy of the estimates resulting from those methods.

The step-by-step instructions and the flowcharts presented in this chapter can be used as a guide to the review process.

2.2 Recommended Estimation Strategy

The strategy recommended for refuges with roads is to use at least one traffic meter (or traffic counter, as it is commonly called) to estimate the total number of visitors who enter the refuge by vehicle, by bicycle, or on foot. Traffic counter data are supplemented by sampling to estimate the percentage of visitors participating in activities (see box: Recommended Strategy 1, page 17).

There are two ways that traffic meters can be used: (1) on stations where there are designated entrance roads used by all visitors, one or more traffic meters can be used to directly estimate total visitation by counting visitors as they enter or (2) to count visitors at key locations where they participate in educational or recreational activities, such as visitor centers, wildlife tour roads, and parking lots for trail heads. It is possible to extrapolate the total number of visitors who enter the refuge using the estimated number of visitors at key locations.

The number of visitors participating in specific activities must either be sampled or indirectly estimated. For some activities, such as environmental education programs, it is possible to obtain an accurate head-count. Participation in activities such as hunting or wildlife observation must usually be extrapolated from limited observations or from the results of surveys such as the Visitor Satisfaction Survey.

Recommended Strategy

Estimating Visitor Numbers on Refuges with Roads

1. **Install and operate at least one traffic counter on an entrance road or at an important visitor services area. Additional counters should be installed as needed to monitor other roads or areas.**

2. **Use scheduled periods of direct observation of visitors to calibrate the traffic counter(s).**

3. **Collect a direct head-count of visitor numbers for special events, environmental education, and interpretative programs. Numbers can be collected by Service employees, volunteers, or group leaders conducting the activities.**

4. **Use a direct head-count or install a doorway traffic counter to estimate visits to visitor centers and contact stations, whenever possible.**

5. **Use scheduled patrols of designated recreational areas to estimate participation in hunting and fishing, whenever possible.**

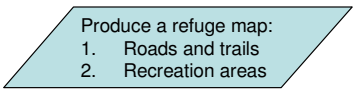
6. **Use activity ratios to estimate visits for recreational or educational activities that are not monitored by traffic counters or direct head-count, including hunting, fishing, wildlife observation, photography, and other compatible uses. The following are acceptable sources of information for calculating activity ratios:**
   - **Visitor Satisfaction Survey results**
   - **Surveys conducted by other agencies**
   - **Visitor registers**
   - **Law enforcement reports, especially for hunting and fishing**

7. **Extrapolate visitation in areas that can not be monitored using statistical estimates based on best professional judgment.**

2.3 Designing an Estimation Plan

2.3.1 Produce a Map of the Refuge

The first step in designing an estimation plan is to decide where visitors will be counted, based on the type and number of roads used by the public to get to educational or recreational activities. A map of the refuge provides a useful tool for identifying and documenting the entrances or access points. The map can be as simple as a hand-drawn diagram or as sophisticated as a digital representation in a geographic information system (GIS). It can be a photocopy of an existing station map or a new map developed specifically for the purpose of visitation estimation planning.



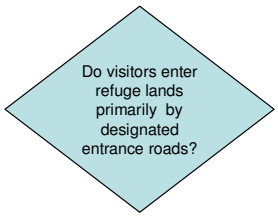
On the map, label all roads that provide specific points of entry to the refuge visitor or access to educational and recreational activities on the refuge, including Service roads and county, state, or federal roads. Do not consider interstate highways or limited access roads that pass through the refuge.

The map should also show all refuge areas or facilities where educational and recreational opportunities are provided to the public, including day-use areas, fishing access points, hunter parking areas, visitor centers, environmental education centers, interpretive trails, boat launches, photo blinds, observation towers, and wildlife tour roads.

The next step is to categorize the roads based on whether they are controlled by the Service or another entity. A different estimation plan will be used for each of the two categories.

2.3.2 Identify Designated Entrance Roads

Do visitors enter refuge lands primarily by designated entrance roads? The entrances do not have to be gated, but the access should be controlled the refuge. If the answer is "yes," then it is possible to use traffic counters on these roads to directly estimate the total number of visitors as they enter the refuge. Even if counters can not be placed at all the entrances, the total number of visitors can still be estimated using a correction factor for the entrances that are not monitored.



For some refuges, staffed fee stations provide another method of counting visitors arriving at designated entrances. For more information on using staffed fee stations to estimate visitor numbers, refer to *Technical Supplement T-5*.

If there are staffed fee stations and it is possible to install traffic counters on the entrance roads, proceed to section (2.3.4). If there are not staffed fee stations and it is not possible to install traffic counters on the entrance roads, proceed to the next section (2.3.3).

2.3.3 Identify Non-Service Roads Used to Enter the Refuge

Do visitors reach educational and recreational activities on non-Service roads, such as county and state highways? These types of roads are frequently used by people passing through but not actually visiting the refuge, and it is often difficult to distinguish between visitors and non-visitors. In that case, it is better to install traffic counters at specific facilities or areas where the majority of visitors use the refuge's resources.

Important facilities and areas where traffic counters could be installed include: visitor centers, interpretive trails, auto tour routes, photo blinds, observation towers, and designated hunting or fishing areas. Consider placing traffic counters at one or more of these locations. Use other methods to relate visitation at the remainder of the locations to the traffic counter numbers.

2.3.4 Install Traffic Counters

First, decide whether to count visitors at the entrances or at visitor use areas. After making this decision, the next step is to select locations to install the traffic counters. Traffic counters can be permanent or can be regularly moved to sample vehicle traffic on different roads or in different areas of the refuge.

The station budget and staffing level will generally determine how many traffic counters can be installed and maintained. Costs for individual units will vary, but a median cost for one is about $500. For each traffic counter that is installed, an average of two to four hours per month will be necessary for maintenance and data collection. If the traffic counters are installed at locations far from the headquarters, driving time must also be considered.

There is no rule for deciding how many traffic counters can be installed and maintained; however, three is probably the limit for most refuges. Choose the most important entrances or areas used by visitors, that is, those entrances or areas used by an aggregate of 80% or more of the visitors.

2.3.5 Choose Methods for Monitoring Visitor Activities

Several methods in addition to traffic counters can be used to collect information about the numbers of visitors participating in educational and recreational activities: total head-count, law enforcement patrols, Visitor Satisfaction Survey, self-registration, and sampling by direct observation. Depending on the range of available activities, more than one method will probably be used. Use the recommendations in Table 2.1 (page 20) as guidelines for choosing methods on refuges where visitor facilities and visitor use areas are reached by roads.

If your refuge has not previously collected information about visitor participation in activities, begin by selecting one or two activities to monitor in the first year. In subsequent years, more activities can be added to the monitoring program.

Once a plan has been outlined for installing traffic counters and monitoring visitor activities, proceed to Section 2.4, "Collecting Data and Estimating Visitor Numbers." However, if the planning process has shown that there are too many entrances, too many widely dispersed visitor services areas, or other considerations that make the methods in this chapter infeasible, then turn to Chapter 3 of the *Workbook*. Chapter 3 discusses methods of visitation monitoring for remote or roadless refuges and wetland management districts.

Table 2.1 Recommended Methods for Estimating Participation in Visitor Activities.

Activities	Recommended Methods
Special events, environmental education programs, and interpretative programs	Total head-count of visitor numbers collected by Service employees, volunteers, or group leaders conducting the activities.
Hunting, fishing, and boating	Patrols by Law enforcement officers, other employees, or volunteers to count vehicles, boats or people (*Technical Supplement T-3*) *or* Results of the Visitor Satisfaction Survey (*Technical Supplement T-6*)
Visits to the visitor center or visitor contact station	Traffic counters installed in doorways (*Technical Supplement T-2*) *or* Volunteer or employee counting visitors entering the building (*Technical Supplement T-1*) *or* Self-registration (see *Technical Supplement T-4*)
Wildlife tour roads and hiking trails	Traffic counters on roads or trails (*Technical Supplement T-2*) *or* Self-Registration at trail heads (*Technical Supplement T-4*) *or* Results of the Visitor Satisfaction Survey (*Technical Supplement T-6*)
Wildlife observation (other than tour road), photography, and most other compatible visitor activities (such as camping)	Visitor Satisfaction Survey, *Technical Supplement T-6*) *or* Guest register at the visitor center or visitor contact station (*Technical Supplement T-4*)

2.4 Collecting Data and Estimating Visitor Numbers

This section of Chapter 2 discusses visitation data collection using traffic counters on refuges with roads. During the development of your estimation plan, you selected one or more entrances or important visitor services areas at which to install traffic counters. (If you do not have a plan for visitation estimation, you may wish to review Sections 2.2 and 2.3 before continuing.) The following eight steps, also shown in the flow chart in Figure 2.4 (page 34), should be followed systematically to collect data using traffic counters.

2.4.1 Collecting Data with Traffic Counters

Step 1 Calibrate Each Traffic Counter Using Direct Observations

Calibration is the process of finding the relationship between the raw data from the traffic counter and the number of visitors actually crossing the counter (see Figure 2.1). This is necessary because highway traffic counters do not directly count the number of visitors, only the number of vehicles that pass. In addition, any counter will usually count over or under the actual number of vehicles at some rate that is unique to the counter and the location. **Calibration factors** are numbers that are determined in the calibration process. The calibration factors will later be multiplied by the raw data from the counter to produce estimates of the numbers of visitors who crossed the counter.

a. Determine the following calibration factors for each traffic counter after it is installed:

(1) number of counter clicks per vehicle

(2) number of persons per vehicle

(3) number of non-visitor vehicles that use the road, compared to the total number of vehicles

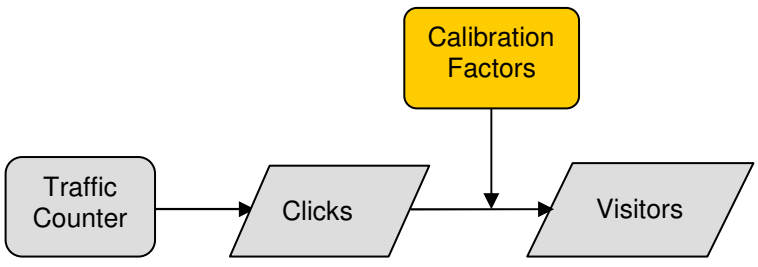


Figure 2.1 Schematic diagram of the relationship of traffic counter "clicks" to the actual number of visitors. The calibration factors are determined by direct observation of several samples of visitors crossing the counter.

b. The following guidelines are recommended for traffic counter calibration:

(1) Use direct observation to perform the calibration. Direct observation is the most accurate way to calibrate a traffic counter.

Calibrate traffic counters regularly

(2) Calibrate each traffic counter regularly, at least once every three years.

(3) Record the following information during each period of observation: number of vehicles observed crossing the counter, number of vehicles actually registered by the counter, and the number of persons per vehicle. When observing the vehicles, keep a separate tally of visitors' vehicles and vehicles driven by Service employees, volunteers, or contractors.

(4) Schedule at least two observation periods for each counter in the first year of operation. Each observation period should be at least two hours in duration, but longer sample periods (4 – 8 hours) produce more accurate results.

(5) Choose observation times that reflect patterns of visitation. Calibration factors, particularly the number of persons per vehicle, may vary with season. For example, it may be necessary to determine separate calibration factors for hunting season.

For more information on using direct observation to calibrate a traffic counter, refer to *Technical Supplement T-2*.

Step 2 Calculate the Number of Visitors for Each Traffic Counter

Follow these guidelines to regularly record data with the traffic counters and estimating visitor numbers.

a. Visit the traffic counters regularly (at least once per month is recommended, but more often is preferred). At each visit, record the number of clicks on the counter. Some devices require manual recording of data, while others allow data to be downloaded to a lap top computer or other portable device.

Collect traffic counter data regularly

b. Compile the information in a database or spreadsheet as soon as it is collected.

c. Use Formula 2.1 to convert raw traffic counter data to the equivalent number of visitors. Formula 2.1 multiplies the raw count from the counter by the number of persons per vehicle and other calibration factors needed for the specific device and setting. Additional information about these calculations is available in *Technical Supplement T-2*.

Formula 2.1 Number of Visitors Crossing a Traffic Counter

Estimated Number of Visitors	=	Raw Count	×	Persons per Vehicle	×	Other Calibration Factors, as needed
		From traffic counter		*From direct observation samples*		*Examples: ratio of visitor to non-visitor vehicles, axle factor for pneumatic counters, etc.*

Step 3 Estimate the Percentage of Visitors Not Crossing Traffic Counters

If a traffic counter is installed at every entrance, skip to Step 5 (page 25).

There are two recommended methods for estimating the percentage of visitors using entrances not monitored by traffic counters: direct observation and best professional judgment. Direct observation is the more accurate method. The following guidelines are written for refuges where traffic counters are located on entrance roads, but similar guidelines apply when traffic counters are installed at specific visitor use areas.

a. Guidelines for Direct Observation

Collect data during scheduled periods of direct observation at entrances not monitored by traffic counters. Follow these guidelines:

(1) Use this method when the daily total number of visitors to the refuge is at least 100, and when there are three or fewer entrances that can be monitored by staff or volunteers (where traffic counters are not installed).

(2) Ignore entrances that receive very low use (less than 5% of total visitation).

(3) Schedule at least one observation period every three years, during a time of maximum visitor activity, in order to obtain the most data for the effort. Observation periods should be at least four hours in duration. Greater accuracy can be obtained with more frequent monitoring, to provide a sample of both the highs and lows of visitor participation.

(4) Place employees or volunteers at entrances (roads or trails) not monitored by traffic counters. During each observation period, the observers will record the number of visitors entering the refuge at these locations. Later, the results can be used to estimate the percentage of visitors not captured by the traffic counters.

b. Guidelines for Best Professional Judgment

Managers can use best professional judgment to estimate the percentage of visitors who are not counted by the traffic counters. The following guidelines are recommended:

(1) Use this method only when it is not feasible to collect data by direct observation.

(2) Carefully document the reasons behind the estimate for the benefit of future managers wishing to update or modify it.

(3) Employ more accurate methods as soon as possible.

Step 4 Calculate a Correction Factor

If a traffic counter is installed at every entrance, skip to Step 5 (page 25).

Use Formula 2.2 (page 25) to calculate a correction factor between the number of visitors recorded by the traffic counter(s) and the total number of visitors. The following steps are written for traffic counters are located on entrance roads, but similar guidelines apply when traffic counters are located at specific visitor services areas.

a. Calculate the total number of visitors recorded by all traffic counters for each observation period (from Step 3). The **recorded total** is the sum of the calibrated numbers from each of the counters for that period.

b. Add the number of visitors visually recorded during the observation period at other entrances (where no traffic counters are installed) to the total number of visitors recorded by the traffic counters in that same period. This is the **corrected total** for the number of visitors.

c. Calculate the **correction factor** by dividing the corrected total by the recorded total of visitors for the same period of time.

d. Calculate an average correction factor for the entire year from the results of all observation periods.

Formula 2.2 Correction Factor for Entrances/Areas Not Monitored by Traffic Counters

Formula 2.2(a)

$$\text{Corrected Total} = \text{Recorded Total} + \text{Observed Visitors at Other Entrances}$$

Formula 2.2(b)

$$\text{Correction Factor} = \frac{\text{Corrected Total}}{\text{Recorded Total}}$$

Step 5 Estimate Visitor Participation in Activities

Count or estimate visitors participating in educational or recreational activities

Use the methods selected in your planning process (Section 2.3.5, page 19) to collect information about the numbers of visitors participating in educational and recreational activities. The following guidelines apply to the estimation methods recommended in Table 2.1 (page 20).

a. Special events, environmental education, and interpretative programs

(1) Record a total head-count of visitors at each event or program.

(2) Use pre-printed forms for consistency in record-keeping, and save the completed forms.

(3) Numbers can be collected by Service employees, volunteers or group leaders conducting the activities.

b. Hunting, fishing, and boating

(1) Use patrols, whenever possible, to estimate visitation from samples of the number of parked vehicles, boats in the water, or the number of visitors. Patrols can be conducted by law enforcement officers, visitor services specialists, other employees, or volunteers.

(2) Record the time and the numbers of vehicles, boats, or persons observed at all locations visited. Also record the visitors' activities, if observed.

(3) Extrapolate total participation from the sample collected. See *Technical Supplement T-3* for detailed information on extrapolating numbers from patrols.

Hunting and fishing participation can also be estimated using Visitor Satisfaction Survey results, if the patrol method is not feasible.

c. Visits to the visitor center or visitor contact station

(1) Install traffic counters in the doorways of the visitor center or visitor contact station.

(2) Calibrate the counters.

(3) Record numbers from the counters daily.

Visitors entering the visitor center or contact station can also be directly counted by volunteers or Service employees.

d. Wildlife tour roads, hiking trails

(1) Install traffic counters on roads or trails.

(2) Calibrate the counters.

(3) Download or record data as often as possible.

Visits to trails can also be estimated using self-registration by visitors at trail-heads.

e. Wildlife observation (other than tour road), photography, and other compatible visitor uses

(1) Use the results of the Visitor Satisfaction Survey to estimate participation. (This method does not require observations during the year.)

(2) If your station has not participated in the Visitor Satisfaction Survey, it may be possible to use results from other similar refuges. For more information about using the Visitor Satisfaction Survey results, see *Technical Supplement T-6*.

Visits for general wildlife observation and photography can also be estimated using a guest register at the visitor center.

f. Multiple-use areas

(1) Use direct observation at areas of the refuge where visitors can participate in several activities. This method is time-consuming but is more accurate than patrols, surveys, or guest registers.

(2) Identify multiple-use areas that receive approximately ten visitors or more per hour.

(3) Schedule at least four observation periods at each area in the first year of sampling. In subsequent years, the amount of observation can be reduced. Observation periods should include both the highs and lows of visitor participation in the activity. Each observation period should be at least two hours in duration, but longer sample periods (4 – 8 hours) produce more accurate results.

(4) Record the total number of visitors and the activities in which they participate during the observation period.

Step 6 Calculate Activity Ratios

Use the data collected in Step 5, about the numbers of visitors participating in specific activities, to calculate activity ratios when there is not a 100% count**. It is not necessary to use the activity ratio if direct observation or a traffic counter has been used to the count visits for an activity.** Follow the steps below corresponding to the methods you used to collect data about visitor activities.

a. Perform the following calculations for activities estimated using the **Visitor Satisfaction Survey**:

(1) Calculate the total number of survey respondents.

(2) Calculate the total number of responses for each activity.

(3) The ratio for each activity equals the number of visitors participating in the activity divided by the number of respondents in the survey.

b. Perform the following calculations for activities estimated using **direct observations**:

   (1) Calculate the total number of visitors observed participating in **each** activity.

   (2) Calculate the total number of visitors observed participating in **all** activities, in all sample periods.

   (3) The ratio for each activity equals the number of visitors observed participating in the activity divided by the total number of number of visitors observed participating in **all** activities.

c. Perform the following calculations for activities estimated using responses on a **guest register**:

   (1) Calculate the total number of visitors who entered responses in the register.

   (2) Calculate the total number of responses for **each** activity listed in the register.

   (3) The activity ratio equals the number of visitors who indicated they participated in the activity divided by the number of entries in the register.

d. Use best professional judgment to estimate activity ratios for which it was not feasible to collect sample data.

2.4.2 Calculating Visitation Estimates

Use the calibrated, corrected traffic counter data from Steps 1-4 (in Section 2.4.1) to estimate the total number of visitors entering the station during the reporting period. Depending on how many entrances there are and how many traffic counters have been installed, the calculations will be somewhat different. To decide which calculations to perform, answer the following questions. Use the formulas that best match the situation on your station.

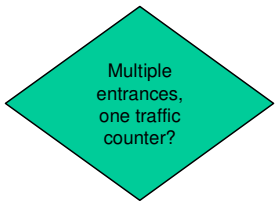
Step 7 **Estimate the total number of visitors**

2.4.2(a) Is there one entrance with one traffic counter?

If the answer is "no," go to 2.4.2(b).

If there is a single entrance monitored by a traffic counter, the total number of visitors is the annual sum of the calibrated results from the counter (from Formula 2.1, page 23). If the number of visitors was calculated monthly or for some other interval, simply add the results for each time period during the year.

2.4.2(b) Are there several entrances, but only one traffic counter?



If the answer is "no," go to 2.4.2(c).

When there are multiple entrances but a traffic counter is installed at only one of the entrances, use Formula 2.3 (page 29) to estimate the total number of visitors.

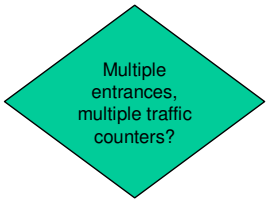
First, calculate the total number of visitors recorded by the counter; the total is the annual sum of the results from the counter (Step 2, Formula 2.1 on page 23) for the entire year. If the number of visitors was calculated monthly or on some other regular schedule, simply add the results for each time period during the year.

Next, multiply the total, calibrated results from the traffic counter by the correction factor that was determined in Step 4.

Formula 2.3 Calculating Total Visits from One Traffic Counter, When there are Multiple Entrances

$$\text{Total Number of Visitors} = \underset{\textit{From Step 2}}{\text{Annual Sum}} \times \underset{\textit{From Step 4}}{\text{Correction Factor}}$$

2.4.2(c) Are there multiple entrances (or areas) with traffic counters installed at more than one entrance (or area)?



When individual traffic counters are installed at several visitor entrances, calculate the total number of visitors entering the refuge using Formula 2.4 (page 30).

First, calculate the total number of visitors recorded by the counter for the entire year; the total is the annual sum of the results from **all** the traffic counters. The number of visitors from **each** traffic counter was calculated using Formula 2.1, from Step 2 (page 23). If the number of visitors was calculated monthly or on for some other interval, simply add the results for each time period during the year.

Next, divide the total number of visitors (from **all** counters) by two. The reason for dividing by two is that every vehicle is recorded once when entering the refuge and once when leaving. The total number of counts is therefore twice the number of vehicles. There are two conditions where this rule would not apply:

(1) If an entrance is located on a dead-end road, and the visitor must enter and leave by crossing the same counter, dividing by two can be done as part of the calibration of that counter rather than at the calculation stage.

(2) If all the counters are designed and located to count only one lane of traffic, then it is not necessary to divide by two.

Finally, multiply the total from all the traffic counters by the correction factor that was determined in Step 4. **If every entrance is monitored by a traffic counter, it is not necessary to use a correction factor.**

Formula 2.4 Calculating Total Visits from Multiple Traffic Counters, when there are Multiple Entrances

$$\text{Total Number of Visitors} = \frac{\text{Annual Sum from all traffic counters}}{2} \times \text{Correction Factor}$$

Results for each traffic counter from Step 2

From Step 4

Formula 2.4 can be used if traffic counters are installed at key visitor use areas rather than at entrances.

Step 8 Estimate the total number of visits for activities

Use the observations collected in Step 5 and any activity ratios determined in Step 6 to calculate the number of visitors who participated in each educational and recreational activity on your refuge. For activities where visitor numbers were collected by head-count (such as environmental education programs) or by traffic-count (for example, on a wildlife drive) the total number of participants for the activity is the annual sum of the numbers recorded in that category. For all other activities, multiply the average activity ratio calculated from Step 6 by the total number of visitors calculated in Step 7. Use Formula 2.5.

Formula 2.5 Total Number of Visitors Participating in an Activity

Total Number of Visitors Participating in an Activity	=	Total Number of Visitors	×	Activity Ratio
		From Step 7		*From Step 6*

Figure 2.2
Designing a Visitation Estimation Plan for Refuges with Roads

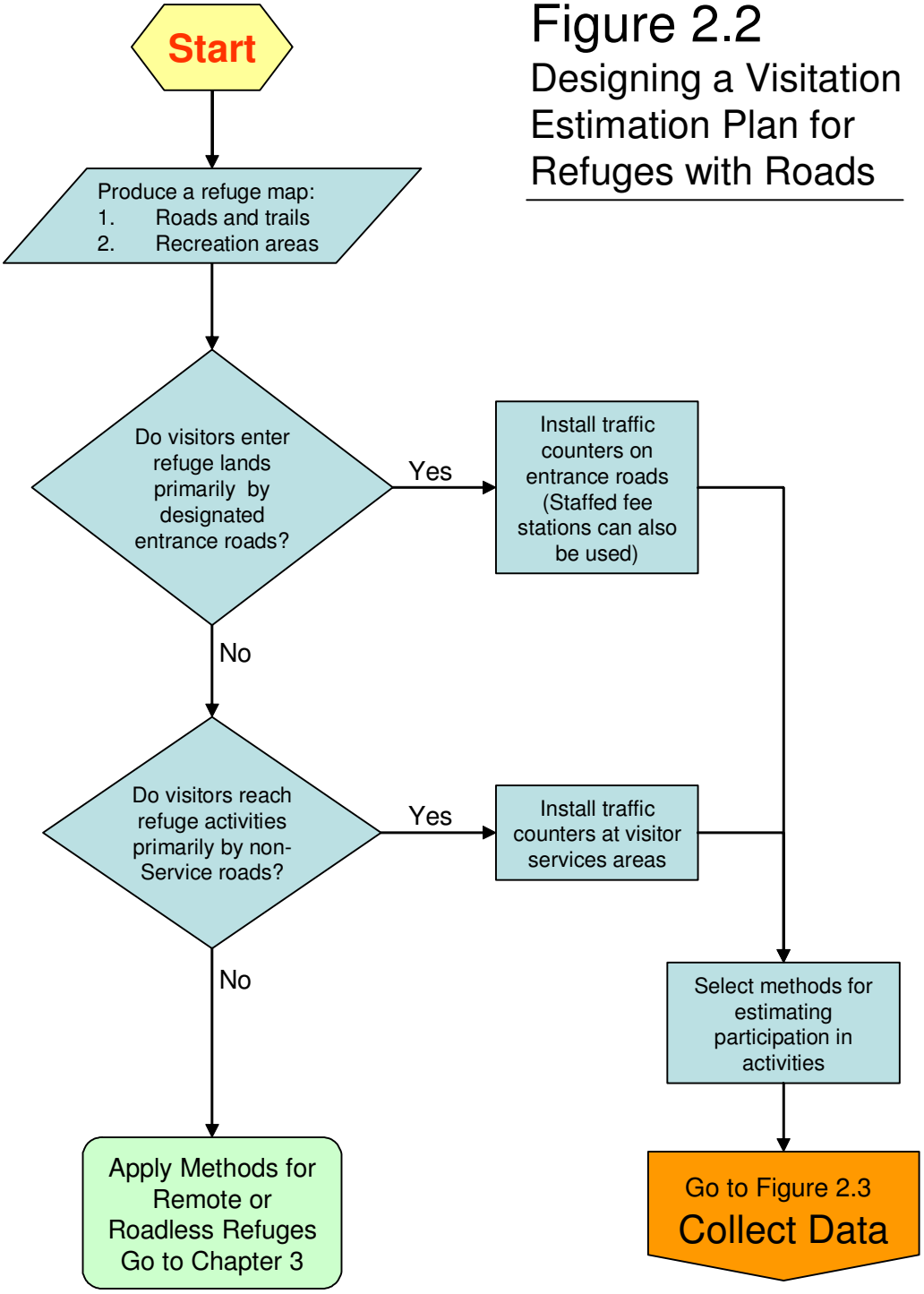


Figure 2.3
Collecting Visitation Data on Refuges with Roads

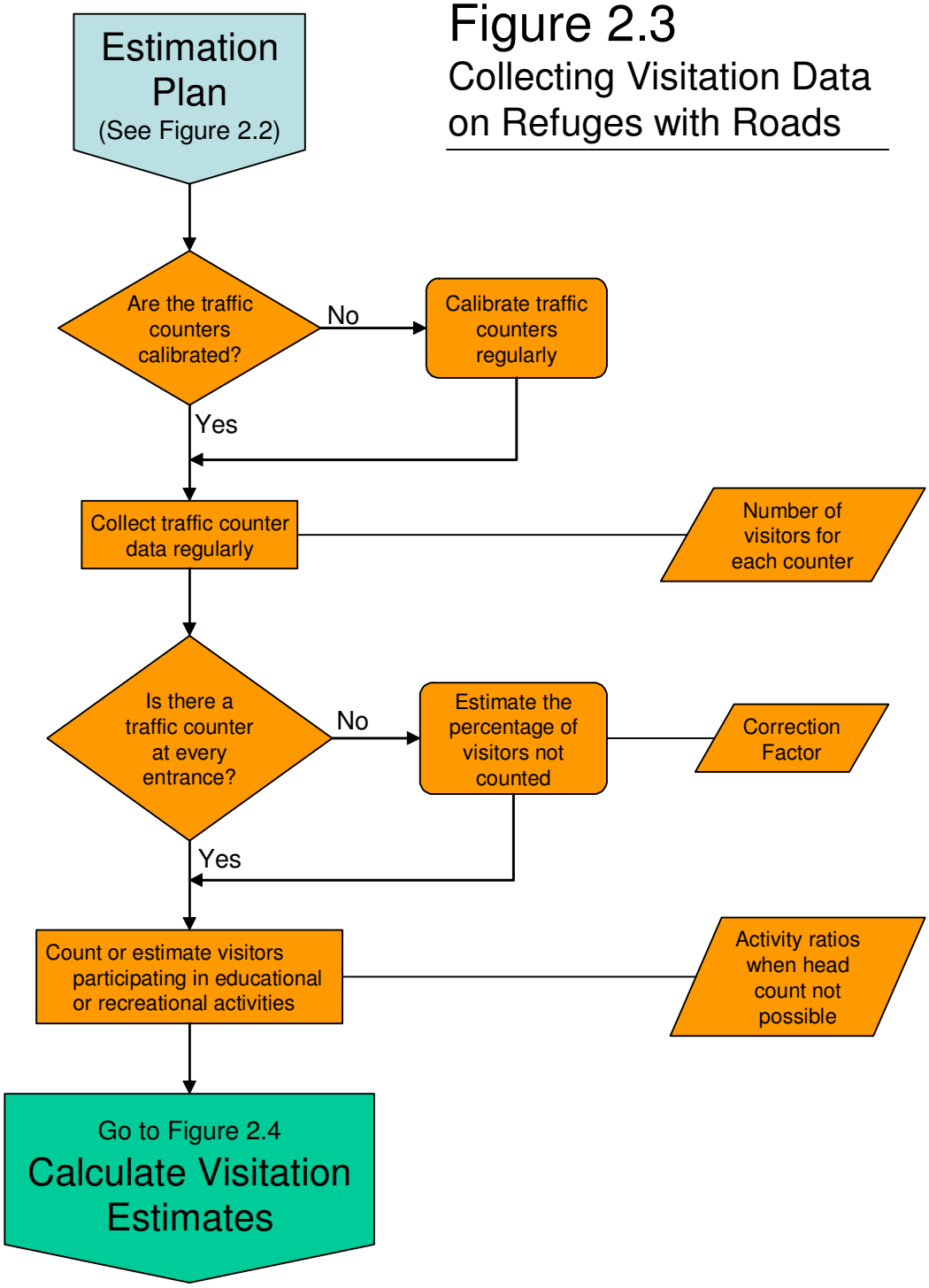
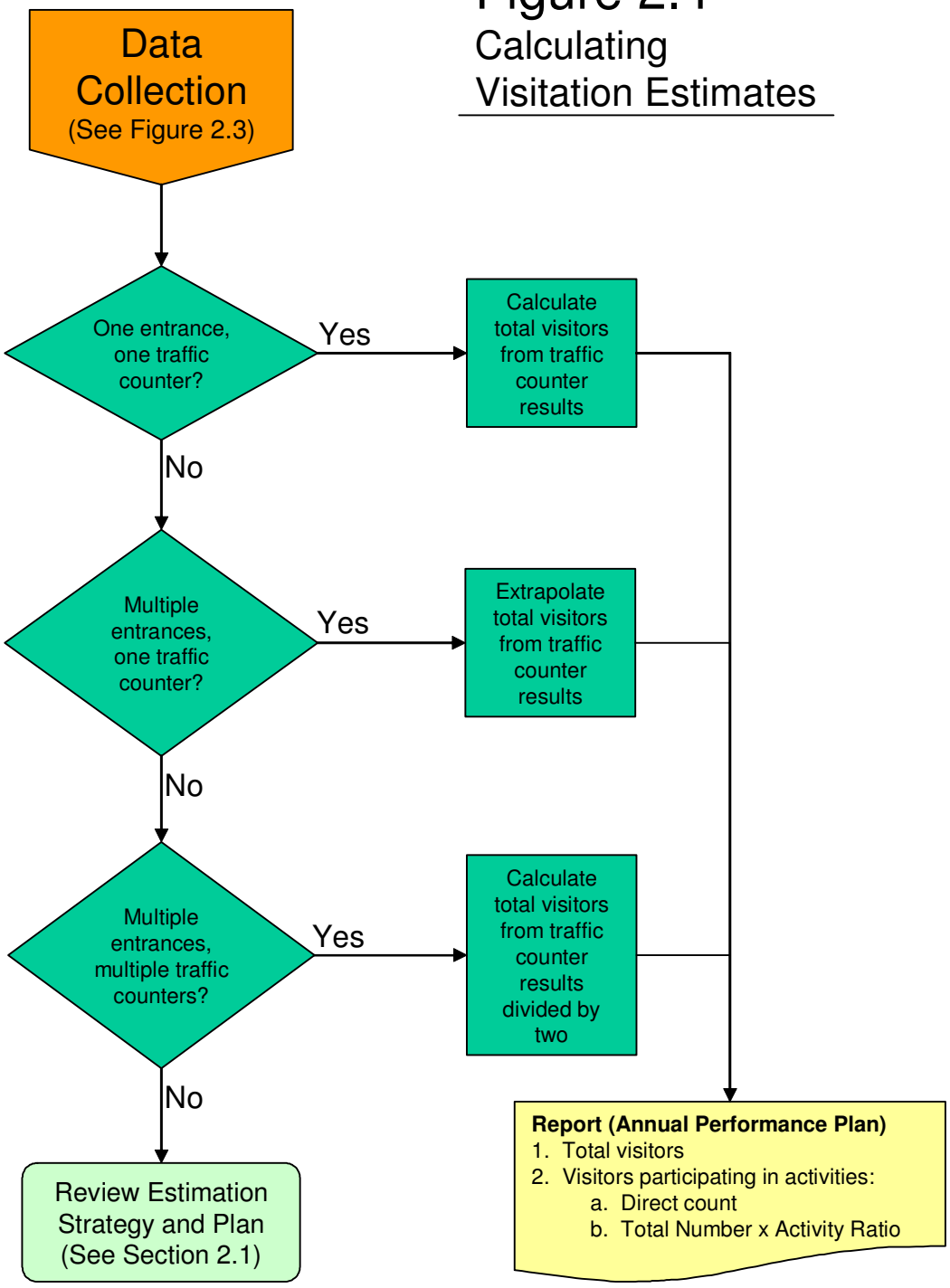


Figure 2.4
Calculating Visitation Estimates



Estimation on Remote or Roadless Refuges

Chapter 3

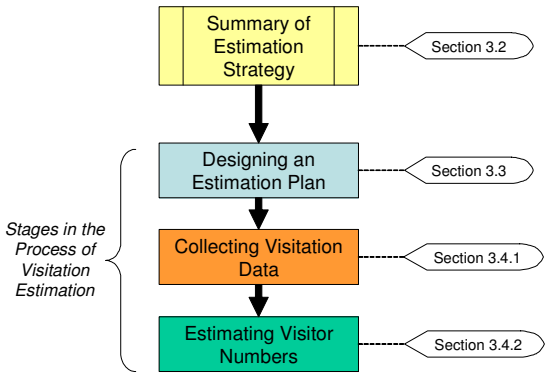
Step By Step Instructions for Estimating Visitor Numbers on Refuges That Are Remote or Those That Are Not Primarily Accessible by Road

3.1 Overview

This chapter discusses methods of estimating visitor numbers when: (1) visitors' activities occur primarily in an unconfined setting (typical of the remote spaces of C.M. Russell or Sheldon); (2) recreational or educational opportunities are numerous or widely separated (typical of wetland management districts); (3) the primary access to the refuge is by air (common in Region 7); or (4) access is gained to rivers, lakes, or impoundments within the Refuge System boundaries, either from non-refuge boat launches or from open waterways (such as Mississippi Valley).

The estimation process described in this chapter is organized in three stages. Each stage has step-by-step instructions and is illustrated by a flow chart, which is included at the end of the chapter. Flow charts are linked to the steps by color-coded symbols in the margin of the text; you may find it helpful to have a copy of the flow charts handy while you read the text.

Organization of Chapter 3



The first stage in Section 3.3 is planning. In the planning stage, you will identify potential sources of data that can be used to estimate visitor numbers. In Section 3.4.1, a template is presented for collecting data during the year. Depending on the way that you decide to collect data, you will be referred to specific *Technical Supplements* that provide more detailed information about particular methods. Finally, the basic formulas for converting raw data into actual estimates of visitor numbers are provided in Section 3.4.2.

3.2 Recommended Estimation Strategy

Whenever possible, the number of visitors participating in educational or recreational activities should be observed and recorded in a planned and systematic way. For some activities, such as environmental education programs, it is possible to obtain an accurate count. Other acceptable methods of sampling include the following:

- Planned patrols conducted by aircraft, boat, or vehicle to obtain a sample of visitors engaged in specific activities at dispersed sites. Examples of situations where patrols may be appropriate: waterfowl production areas; parking lots for boat launches, fishing areas, or hunting areas; hiking trails; and riverside campsites.

- Self-registration at trail heads, boat launches, or hunting areas can provide a minimum estimate of use at these areas.

- Visitor surveys (such as the Visitor Satisfaction Survey) can be used to estimate what activities visitors participate in. Remember that Service policy requires pre-approval of all other surveys.

- Information from state agencies, such as reports on hunting or fishing, can be used to estimate the occurrence of these activities on refuge lands or waters.

However, opportunities for observing visitors may be very limited in remote and roadless settings. Often, only small samples of visitors are observed on an infrequently, ad hoc; but estimates of the number of visitors can be extrapolated from the limited observations. Reports by employees or volunteers who observe visitors while performing other routine duties can be a valuable source of information for making estimates.

If no other method is feasible, best professional judgment can be used to produce reasonable estimates of the daily, weekly, or monthly participation in specific activities.

Recommended Strategy

Estimating Visitor Numbers on Roadless or Remote Refuges

1. Observe and record the number of visitors participating in educational or recreational activities whenever it is possible to do so. The amount of data that can be collected about some activities may be very limited because of the types of resource setting being considered.

2. Use the observations to estimate the number of visits for educational or recreational activities on the refuge.

3. Extrapolate the total number of visitors by combining observations of the numbers of visitors participating in different activities.

4. Assume that the upper limit of the total number of visitors is the sum of estimated visits for all educational and recreational activities.

5. Subtract the number of visitors who participated in multiple activities from the net count of visits for all activities to give a corrected total number of visitors.

6. Use best professional judgment to estimate visitor numbers when no other means are feasible.

3.3 Designing an Estimation Plan

3.3.1 Identify Activities that Occur on the Refuge

Start the planning process by making a list of the educational or recreational activities that take place on the refuge or wetland management district. Next, list any sources of data that are already being used to estimate visitor numbers for those activities. Examples of data include, but are not limited to: tallies of visitors participating in environmental education workshops or interpretive programs; reports from outfitters operating on the refuge; and surveys that have been conducted or are planned for the future, such as the Visitor Satisfaction Survey.

3.3.2 Identify Potential New Sources of Data

After listing the available activities and reviewing the information that is already being collected, answer the following questions (also presented in the flow chart in Figure 3.2, page **47**). Each question relates to a possible source of data that can be used to estimate visitor numbers on remote or roadless refuges. For each question answered with a "yes," there is a specific action-step recommended. The action-steps refer to methods of data collection that are described in more detail in the *Technical Supplements* that support the *Workbook*. After answering all the questions in Sections 3.3.2a-f, proceed to Section 3.4.

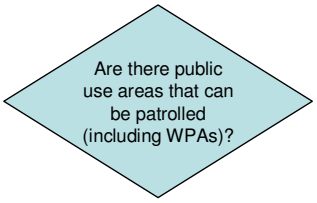
3.3.2(a) Are there locations on the refuge or wetland management district where traffic counters can be used?

Appropriate locations would include designated wildlife tour routes, hiking trails, and boat ramps close enough to a headquarters or field station for the counters to be visited routinely for maintenance and for downloading data. If there are such locations, refer to *Technical Supplement T-2* for more information about using traffic counters.

3.3.2(b) Do visitors routinely visit the headquarters office or visitor center?

If they do, consider placing a visitor register in the entrance or alcove. Include a place in the register for visitors to provide information about their group size and the activities they are planning to participate in while they are on the refuge. Refer to *Technical Supplement T-4* for more information about using registers.

3.3.2(c) Are there areas where scheduled patrols can be used to estimate the number of visitors participating in activities?



Examples of situations where patrols may be appropriate: waterfowl production areas (WPAs); parking lots for hiking trails or hunting access; riverside campsites; designated fishing areas; and boat ramps on rivers, lakes, or impoundments. In this method, the visitor use areas are first categorized according to accessibility, type of activity, season, size, or other criteria. Next, patrols are arranged to visit a sample of the areas. From the patrols, the total visitation can be estimated from the number of visitors observed in the sample. For more information about using the patrol method, especially for WPAs, see *Technical Supplement T-3*.

3.3.2(d) Have surveys been conducted on the refuge or wetland management district?

Visitor surveys, such as the Visitor Satisfaction Survey, can be used to estimate participation in specific activities. Remember that Service and congressional policy require pre-approval of surveys. For further details about using surveys to determine activity ratios, group sizes and other information, consult *Technical Supplement T-6*.

3.3.2(e) Can information from other agencies be used to estimate visitor numbers?

State fish and wildlife agencies routinely conduct surveys of hunters and anglers, or perform aerial surveys to count the number of boats operating on state waters. State tourism agencies sometimes conduct extensive surveys about the destinations and activities of visitors to their states. Depending on the level of detail of the information, it may be possible for this information to be used to estimate visitation on the refuge for those activities.

3.3.2(f) Can employees or volunteers collect visitor use data while performing other duties, if it is not possible to implement a patrol route?

Reports of law enforcement officers, biologists, maintenance personnel or volunteers who observe visitors while performing other routine duties can provide useful information about visitor numbers even if the observations are not made according to a regular schedule. This method can be facilitated by developing a standard form for recording the date, location, number of persons, and observed activities and then providing the form to all staff members.

3.4.1 Collecting Visitation Data

Carry out the following steps each year to collect the data that are needed for estimating visitor numbers. The steps are summarized in the flow chart in Figure 3.3.

Step 1 **Collect Routine Observations**

Collect routine observations for
- Programs & events
- Outfitter reports
- Traffic counters
- Guest registers
- Patrols

For educational or recreational activities that can be routinely observed, follow these guidelines:

a. Establish a schedule at the beginning of the reporting year (October 1) for collecting observations.

(1) Ask employees, volunteers or group leaders to count and record the number of participants at environmental education programs, interpretive programs, or special events.

(2) Plan to visit any traffic counters that are installed in high visitation areas at least once per month.

(3) Collect pages from registers at the headquarters office, visitor center, trail heads, or other locations at least once per month.

(4) Collect reports from outfitters who operate on the refuge.

(5) Ask for reports from outside agencies, such as state game and fish departments, that collect data on the refuge.

b. The recording process can be facilitated by making a pre-printed data sheet available, including a map that employees and volunteers can use to quickly and easily mark the route taken and the observations made. Save the collected information in a spreadsheet or database, if possible.

Step 2 Collect Non-Routine Observations When Possible

Ask law enforcement officers, biologists, other employees, or volunteers to record observations of visitors whenever they are out on the refuge or wetland management district.

Collect other observations when possible from:
- Law enforcement officers
- Biologists
- Volunteers

a. Record the following information for all observations:

(1) Number of visitors, or indirect evidence of visitor presence such as tents or boats.

(2) Date and location of each observation.

(3) Activities in which visitors were participating, if observed.

(4) Person who made the observation.

b. The recording process can be facilitated by making a pre-printed data sheet available, including a map that employees and volunteers can use to quickly and easily mark the route taken and the observations made. It is also important to record locations where visitors were **not** observed. Save the collected information in a spreadsheet, database, or GIS data layer.

Step 3 Compile Visitation Data

Compile all information collected from routine regular observations (Step 1) and occasional observations (Step 2.) This will usually be done near the end of the reporting year, prior to preparing visitation reports.

a. It may be helpful to call a meeting for everyone who has been involved with collecting visitation data during the year, including law enforcement officers, biologists, visitor services specialists and volunteers.

b. Group the compiled data by activity, for example, all observations of visitors using trails, or all observations of visitors hunting. For wetland management districts collecting information by planned patrols, it may be easier to collate the information first by area (such as a waterfowl production area or boat launch) and then by activity.

c. Save the compiled results for the next step and for comparison purposes in subsequent years.

3.4.2 Calculating Visitation Estimates

In Section 3.4.1, the steps were listed and discussed for collecting, compiling, and tallying observation s of visitor numbers. Section 3.4.2 presents the steps necessary to calculate estimates of the number of visitors engaged in specific activities and the total number of visitors. If possible, the steps in the calculation process should be carried out at the same staff meeting discussed in Step 3.

Step 4 Estimate Visitor Numbers from Routine Observations

Calculate the total number of visits for each educational or recreational activity from the total number actually recorded. Keep activity totals separate.

Calculate total visits for each activity recorded by routine observation

a. Calculate the total number of visits for activities where the numbers were collected by head-count. Typically, this category includes environmental education and interpretation programs and outfitter reports.

b. Calculate the total visits for activities that were observed routinely, but which do not represent a 100% head-count. This would include data collected using traffic counters and guest registers.

Step 5 Extrapolate the Total Number of Visits for Occasional Observations

The following steps are necessary for **each** recreational activity. All calculations should be carefully documented so that comparisons can be made in future years.

Extrapolate total visits from occasional observations

a. Tally the total number of visitors recorded.

b. Tally the total number of separate observations taken. For example, if the number of anglers was counted at one different location ten times during the year, the number of observations would be ten. If enough data were collected, group the observations by location; for example, if the number of anglers was counted five times at each of two locations.

c. Calculate the average number of visitors per observation (Formula 3.1, page 43). If data were grouped by location, calculate an average number of visitors per observation for each location. (For wetland management districts using the patrol method to estimate visitation, observations are usually grouped into strata. See *Technical Supplement T-3* for more information on calculations from stratified samples.)

d. Count or estimate the number of similar locations where the activity can reasonably occur **at one time**.

   For unconfined or widely dispersed activities that are not restricted to specific locations, use best professional judgment to estimate the number of similar areas where the activity can reasonably be expected to occur at the same time. An "area" could be a single lake, a whole valley, a stretch of river, or an entire watershed. This would be particularly true for dispersed hunting and fishing activities in Alaska. Although there may literally be thousands of individual locations where a moose hunter might land in a small plane, not all of the locations will be used at the same time. One way to estimate the number of similar areas is to compare the number of locations where visitors were observed with the possible locations along the route where the observations were made (Step 2b).

e. Estimate the number of days of the year when the activity is likely to occur.

   As with (d), this will require best professional judgment and knowledge of the patterns of activity on the refuge or wetland management district. The upper limit of the number of days is defined by the allowed season for the particular activity, but it will also be affected by weather and other variables.

f. Calculate the estimated total number of visits for each activity (Formula 3.2) from the average number of visitors recorded per sample, the number of locations where the activity occurs, and the number of days when the activity could occur.

g. If you have recorded the data and calculations in a spreadsheet or database, save and print the results.

Formulas Used for Extrapolating Visitation Estimates from Observations

Formula 3.1

$$\text{Average Number of Visitors per Sample} = \frac{\text{Number of Visitors Observed}}{\text{Number of Observations}}$$

Formula 3.2

$$\text{Visits for this Activity} = \text{Average Number of Visitors per Sample} \times \text{Days per Year} \times \text{Locations or Areas}$$

Days per Year: Estimated number of days per year when the activity can occur

Locations or Areas: Estimated number of locations or areas where the activity can occur

Step 6 Use Best Professional Judgment

Where no data are available, use professional judgment

When it is not possible to collect observations and there are no other sources of data for estimation, the manager can use best professional judgment to report the number of visitors participating in activities that occur on the station. Follow these guidelines when using professional judgment:

a. Use Formula 3.3 (page 45) to estimate participation.

   Formula 3.3 is like the Formula 3.2 used in Step 5, because it requires three quantities as inputs for each activity: the number of places where the activity can occur on the station, the number of days per year when the activity can reasonably be expected to occur, and the average number of visitors per unit of estimation. However, if there are no observations available as a basis of estimation, every part of the formula must be estimated based on professional judgment and experience.

b. Pick a **unit of estimation** for each activity.

   (1) A unit of estimation is any convenient way of separating the activity into allocations that can be estimated.

   (2) For activities that occur at distinct areas or sites, the most practical unit of estimation is a specific type of recreation area or facility, such as waterfowl production areas or boat launching sites.

   (3) In an unconfined setting where the activities are not linked to a specific location, the unit of estimation depends on the activity. A reasonable unit for estimating hunting might be area, measured in square miles or square kilometers. Bank fishing or camping on a river could be estimated based on unit miles of shoreline, while for lake fishing the unit would be number of lakes.

c. Estimate the number of units that are present on the station.

d. Estimate the number of days when these units could be used by visitors.

   The upper limit of the number of days is defined by the allowed season for the particular activity, but it will also be affected by weather and other variables.

e. Estimate the density of visitors per unit.

   This is where experience and professional judgment are most important. If there is no other basis for your decision, use powers of ten to make a

reasonable estimate. That is, based on experience and judgment, would there be one visitor per unit per day; ten per unit per day; one hundred? Discuss the situation with your employees and volunteers and adjust the initial estimate up or down until there is general agreement that it is reasonable.

f. Record the estimation process for use in subsequent years.

Formula 3.3: Estimating Participation in One Activity, Using Professional Judgment

Visits for this Activity	=	Units	x	Days per Year	x	Visitors per Unit
		Estimated number of units where the activity can occur		*Estimated number of days per year when the activity can occur*		*Estimated number of visitors who participate in the activity per appropriate unit of estimation*

Step 7 Estimate the Total Number of Visitors

In Step 4 and Step 5, the total numbers of visits for individual activities were estimated, using limited data, or by professional judgment. Use those results to estimate the total number of visitors to the station. Follow these guidelines:

a. Calculate the total number of visits to the refuge.

The total number of visits to the refuge is the sum of the visits estimated or recorded for each individual activity. Add the results for all educational and recreational activities calculated from Step 4 and Step 5. This sum is the upper limit of the number of visitors to the refuge.

Maximum total visitation = sum of visits all for activities

b. Estimate how many activities the average visitor participated in.

For example, how many visitors who hunted also stopped at the refuge headquarters to obtain educational information? Although this would be difficult to know for each specific activity, it is quite reasonable to estimate the average number of activities in which the typical person participated. This will depend on who the typical visitor is, and what the most popular activities are. Sources of information for determining this num-

ber include results of the Visitor Satisfaction Survey for your refuge or similar refuges in your region, guest register responses, and best professional judgment.

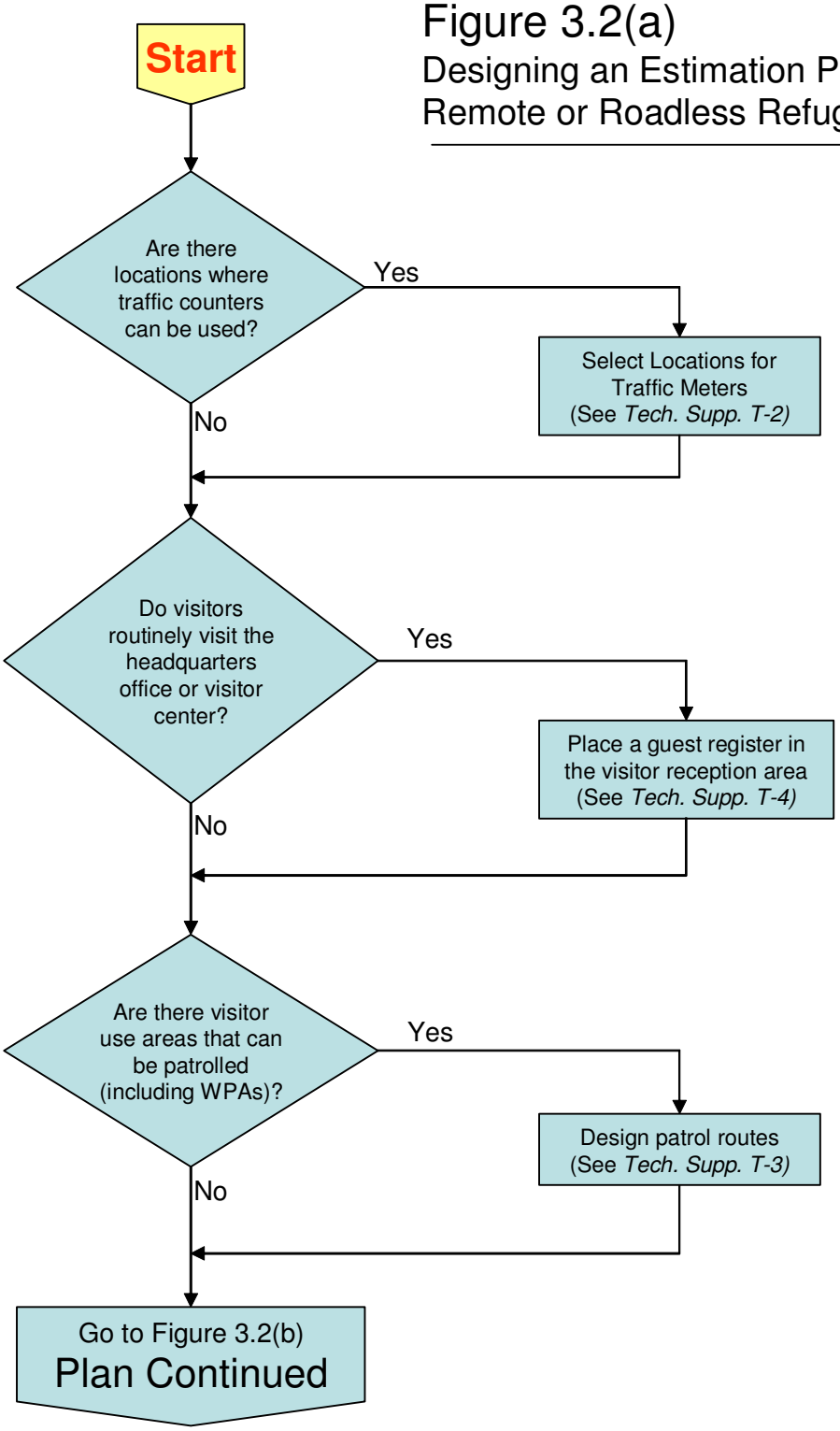
c. Divide the total number of visits (upper limit of the number of visitors) by the average number of activities per visitor (Formula 3.4). The result is the corrected total number of visitors.

Total Visitors = Total Visits divided by Activities per Visitor

Formula 3.4: Formula for Total Visitors

$$\text{Total Number of Visitors} = \frac{\text{Total visits}}{\text{Average Activities per Visitor}}$$

Figure 3.2(a)
Designing an Estimation Plan for Remote or Roadless Refuges



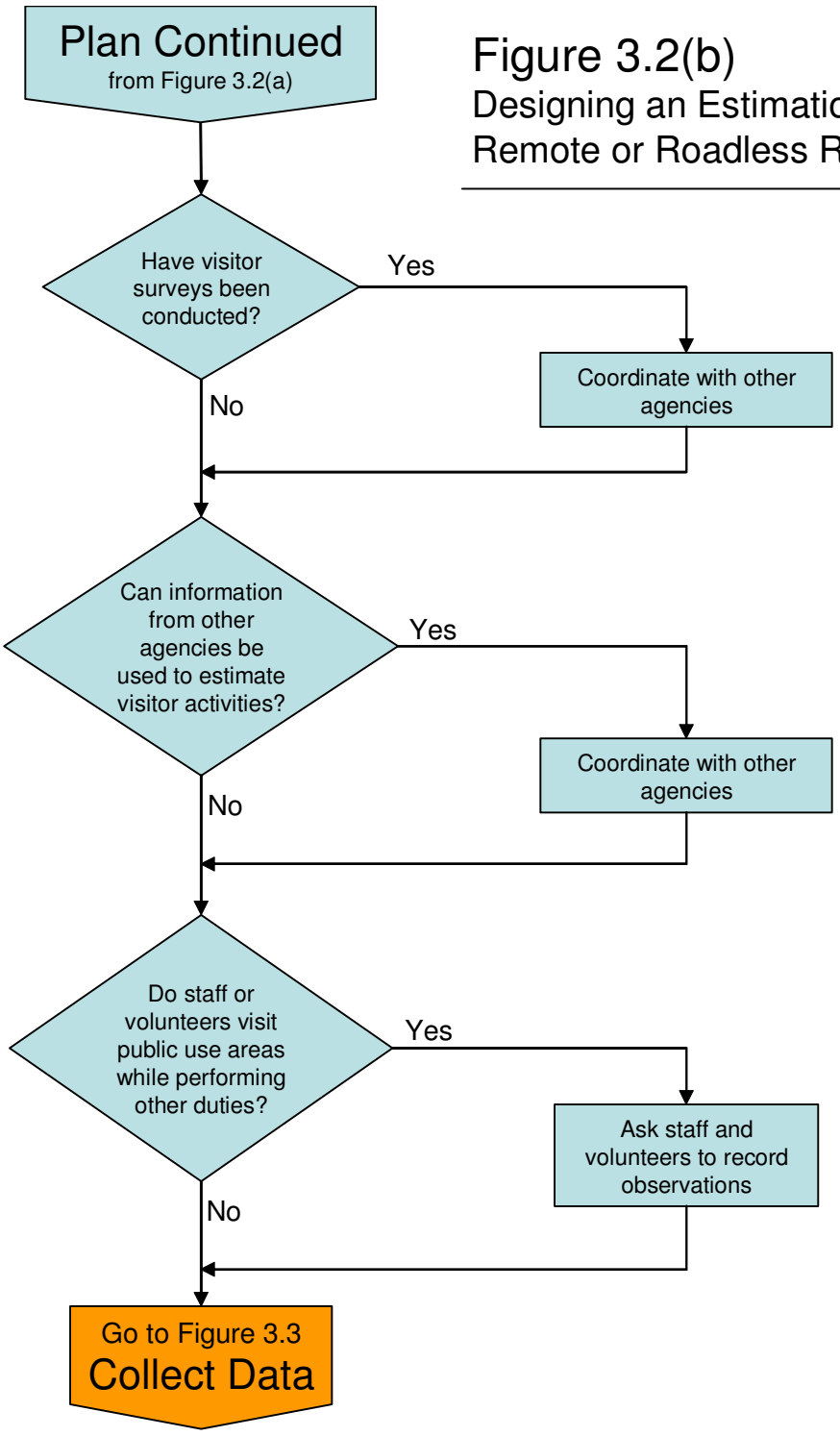


Figure 3.2(b)
Designing an Estimation Plan for Remote or Roadless Refuges

Figure 3.3
Collecting and Managing Data on Remote and Roadless Refuges

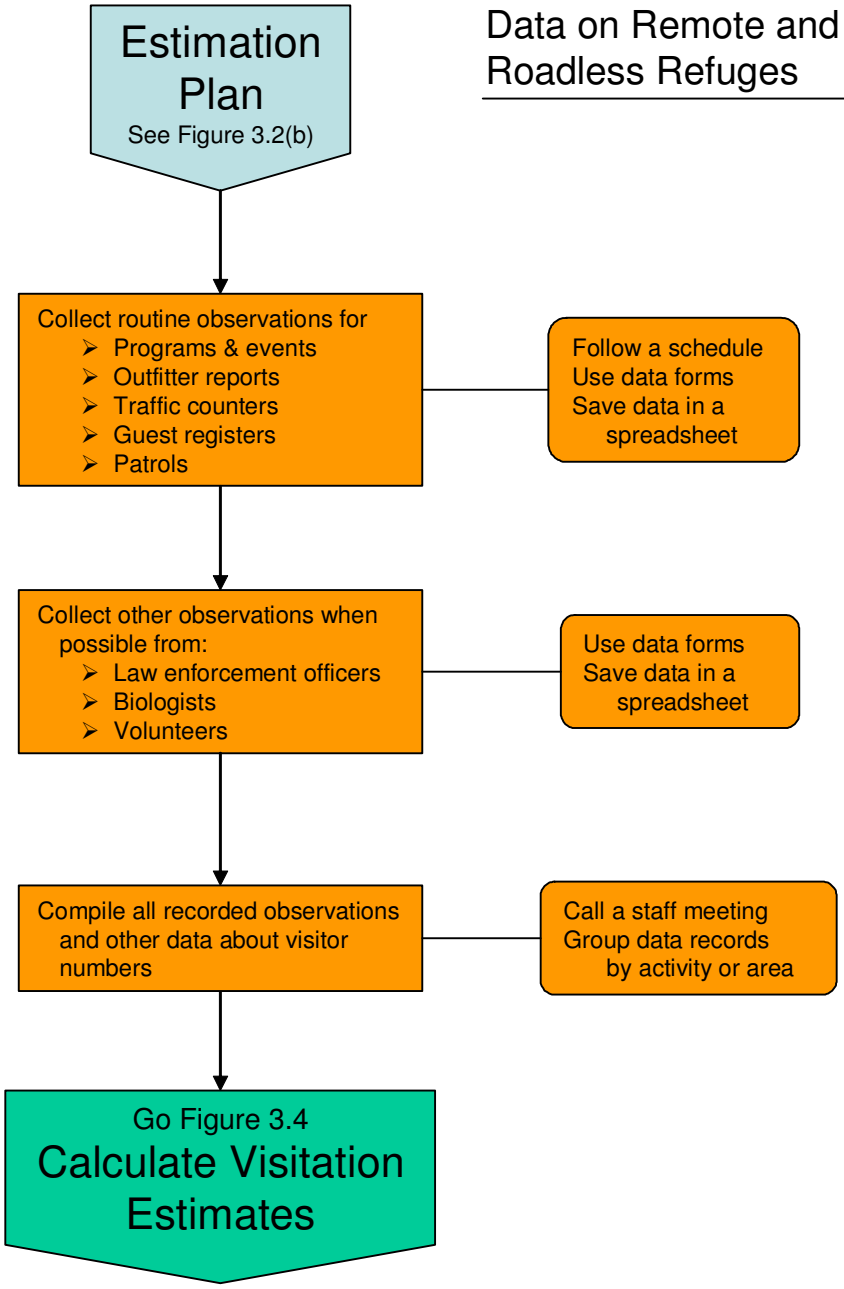
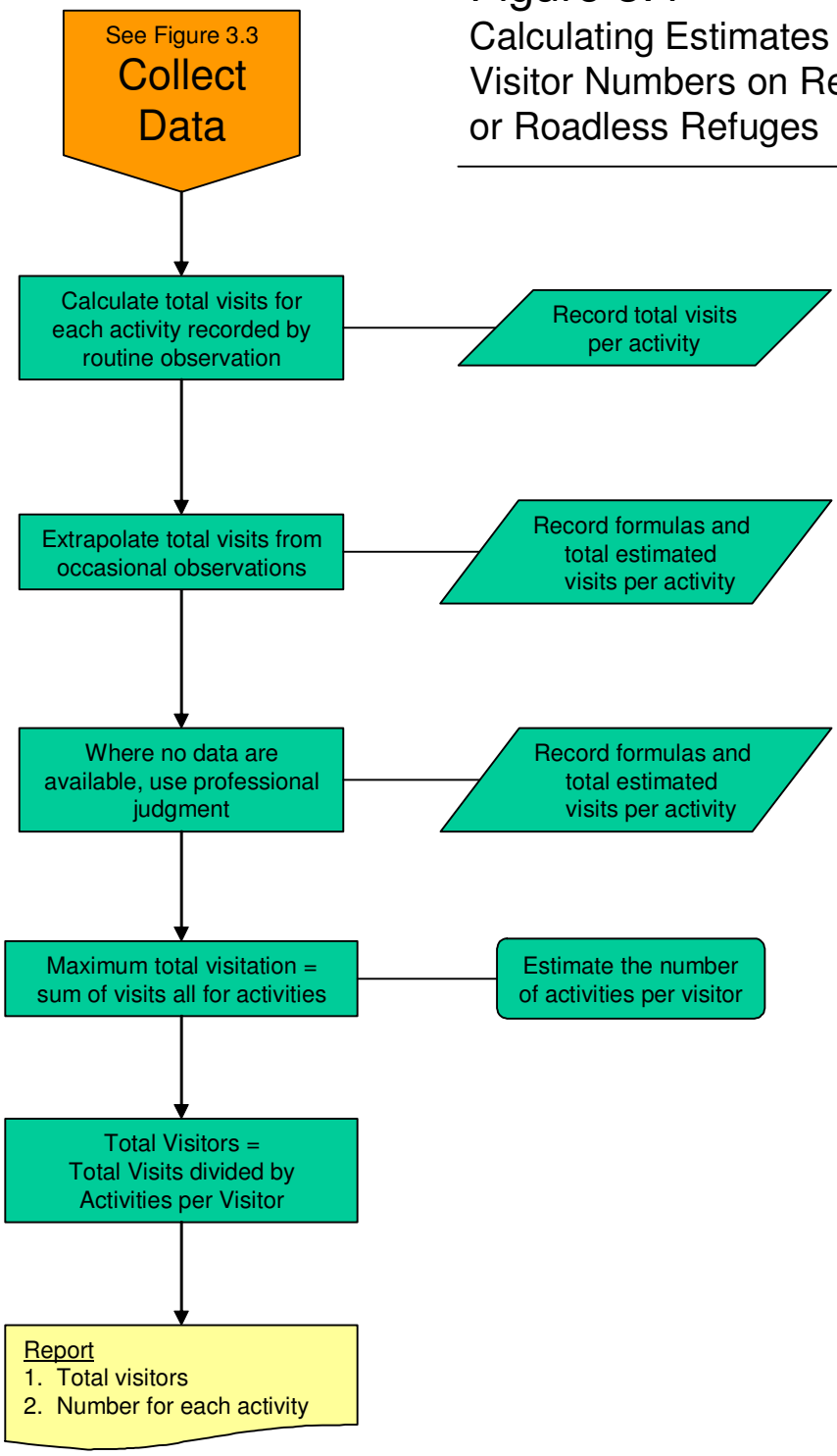


Figure 3.4
Calculating Estimates of Visitor Numbers on Remote or Roadless Refuges



Estimation Methods for Specific Applications

Appendix A

Estimation Methods for Some of the Most Common Visitor Services Facilities and Recreation Settings Found in the Refuge System

For easy reference, the information in this appendix is presented in tables that are organized by broad categories of educational or recreational activity, such as wildlife observation. In each table, the first (left-most) column identifies common facilities where the activities occur. In the second column, the characteristics of the facilities or recreation setting are briefly described. For each type of facility, the third column contains an outline of at least one recommended method of collecting data for the purpose of estimating visitor numbers. The recommended method is considered the best from the perspective of the quality of the data that is provided. For situations where the recommended method is not feasible, the fourth (or right) column provides one or more suggestions for alternate methods. Alternate methods are usually less expensive than the recommended method, but yield less data or data that is less reliable.

The information in these tables is intended as a supplement to the detailed discussion of estimation strategies in Chapter 2, and methods in Chapter 3 of the *Workbook*.

Table A-1 Environmental Education, Interpretation, and Orientation

A-1.1 Environmental Education Facility

A-1.2 Programs on-site without facilities

A-1.3 Programs on-site, non-staff

A-1.4 Visitor Centers and Contact Stations

A-1.5 Interpretive Kiosks

Table A-2 Hunting and Fishing

A-2.1 Waterfowl Production Area

A-2.2 Hunting Areas: Quota or Permit System

A-2.3 Hunting: Non-Quota

A-2.4 Fishing: Designated Areas

A-2.5 Fishing: Open Access

Table A-3 Wildlife Observation

A-3.1 Trails: Foot

A-3.2 Trails: Boat

A-3.3 Trails: Auto

A-3.4 Photo Blinds, Observations Towers and Platforms

Table A-4 Concessions and Guided Activities

A-4.1 Guided Tours

A-4.2 Outfitted trips

A-4.3 Aircraft

Table A-5 Non-Wildlife-Dependent Activities

A-5.1 Camping

A-5.2 Picnic Areas

A-5.3 Refuge System Lakes

A-5.4 Boating - Non-System Lakes

A-5.5 Boating - Rivers

Table A-1 Environmental education, interpretation, and orientation. The left-most column identifies the facility or public education setting. In the second column, the characteristics of the facility or setting are briefly described. The third column contains a short summary of at least one recommended estimation method, which is considered to yield the highest quality data. The fourth column provides one or more suggestions for other methods, which are usually less expensive, but yield less data or data that may not be as reliable.

Facility or Setting		Description	Recommended Methods	Alternate Methods
A-1.1.	Environmental Education Facility	Educational center or auditorium. Use is generally by prior arrangement.	Direct count of participants by Service employees or volunteers in cooperation with group leaders	Doorway traffic counter, such as passive or active infrared. Visitor register, including an entry for group size.
A-1.2.	Environmental Education or Interpretation Programs on-site, not in a facility	Workshops and classes arranged in advance and conducted at refuge, but not necessarily in a building.	Direct count of participants by Service employees or volunteers	Report by group leader
A-1.3.	Environmental Education, not conducted by staff or volunteers	Pre-arranged use of facilities by groups such as Audubon. Some stations also include self-guided visits by school groups as part of this category.	Self-reporting by group leaders for outside organizations using facilities.	Trail register for self-guided trails
A-1.4.	Visitor Centers and Contact Stations	Buildings; usually open for specified hours. Differ by size and function.	Employee or volunteer designated to count visitors as they enter	Door traffic counter, such as passive or active infrared. Visitor register, including an entry for group size.
A-1.5.	Interpretive Kiosks	Open, free-standing structure with one or more panels for refuge information and interpretation	Periodic direct observation of visitors using kiosks. Multiply counts per observation period by total time.	Visitor Satisfaction Survey results or self-reporting on register at visitor center or visitor contact station. Calculate activity ratio and multiply by total visitors to refuge.

Table A-2 Hunting and fishing. The left-most column identifies the facility or recreation setting. In the second column, the characteristics of the facility or recreation setting are briefly described. The third column contains a short summary of at least one recommended estimation method, which is considered to yield the highest quality data. The fourth column provides one or more suggestions for other methods, which are usually less expensive but yield less data or data that may be less reliable.

Facility or Setting	Description	Recommended Methods	Alternate Methods
A-2.1. Waterfowl Production Areas	Dispersed areas, often with adjacent parking. Access is by non-Service roads	Patrol Routes. Sample of WPAs is visited on pre-defined schedule, vehicles are counted, number of visitors is estimated from counts	Visitor Surveys, such as windshield surveys. Approved surveys; including questions about activity, number of persons per party, areas visited, length of stay
A-2.2. Hunting: Quota or Permit System	Limited number of hunters permitted by station. Hunting may be confined to designated zones.	Permit awarded by lottery or other method; in addition to state hunting license. Permit should include reporting requirement for hunters: days spent hunting, number of persons per party, number of times visited annually.	Scheduled patrols. FWS staff conduct regular patrols of hunter access areas during hunt season, count vehicles, and estimate number of hunters from vehicle counts
A-2.3. Hunting: Non-Quota	Typically conducted from dispersed locations such as roadside parking areas or boat launches in specified seasons. Numbers not regulated by refuge.	Scheduled patrols. FWS staff conduct regular patrols of hunter access areas during hunt season, count vehicles, and estimate number of hunters from vehicle counts	Unscheduled patrols when staff is available or performing collateral duty at the same location. Officers keep log of hunters or vehicles observed, from which an estimate of total number is extrapolated.
A-2.4. Fishing: Designated Areas	Designated fishing areas include ponds, pools, levees banks and impoundments	Scheduled patrols: FWS staff or volunteers conduct regular patrols of angler access areas during fishing season, count vehicles, and estimate number of anglers from vehicle counts.	Random checks by LE officers: unscheduled patrols when staff is available or performing collateral duty. Officers keep log of anglers or vehicles observed, from which an estimate of total number is extrapolated.
A-2.5. Fishing: Open Access	Typically conducted on lakes and impoundments accessed from dispersed locations such as roadside parking areas and boat launches	Direct count of boats/area in designated sectors of lake or river. Extrapolate total number from direct counts multiplied by total area of lake or river within station.	Correlation of data collected by state or other federal agencies for launches, lockages, permits or licenses, with an indirect indicator such as the number of boats visible at one point or number of vehicles on an access road

Table A-3 Wildlife observation. The left-most column identifies the facility or recreation setting. In the second column, the characteristics of the facility or recreation setting are briefly described. The third column contains a short summary of at least one recommended estimation method, which is considered to yield the highest quality data. The fourth column provides one or more suggestions for other methods, which are usually less expensive, but yield less data or data that may not be as reliable.

Facility or Setting	Description	Recommended Methods	Alternate Methods
A-3.1. Trails: Foot	Designated foot trail, possibly with map or interpretive leaflet	Pedestrian Traffic Counter Self-reporting at trail head register, with entry for group size. Extrapolate total number from recorded number multiplied by correction factor determined by direct observation.	Periodic foot patrols by staff or volunteers. Count number of persons on trail. Extrapolate total number from counts per time period multiplied by total time, or counts per mile multiplied by total trail miles. Self-reporting on visitor register at visitor center or visitor contact station. Calculate activity ratio and multiply by total visitors to refuge.
A-3.2. Trails: Boat	Designated water route, possibly with map or interpretive leaflet	Periodic vehicle counts at launch point. Extrapolate total number from observed vehicles per day multiplied by number per vehicle and number of days in the observation period. Self-reporting at trail head register box. Extrapolate total number from recorded number multiplied by correction factor determined by direct observation.	Periodic water patrols by staff or volunteers to count number of canoes on trail. Extrapolate total number from counts per time period multiplied by total time. Visitor Satisfaction Survey results or self-reporting on register at visitor center or visitor contact station. Calculate activity ratio and multiply by total visitors to refuge
A-3.3. Trails: Auto	Designated route on refuge or non-refuge roads, generally with an interpretive leaflet or signs	Vehicle Traffic Counter. Calculate total number from vehicle counts multiplied by number of persons per vehicle. Correct for non-visitor vehicles, if necessary.	Periodic direct observation of vehicles. Extrapolate total visitors from number of vehicles observed per day multiplied by days in the reporting period and persons per vehicle. Visitor Satisfaction Survey results or self-reporting on register at visitor center or visitor contact station. Calculate activity ratio and multiply by total visitors to refuge.
A-3.4. Photo Blinds, Observations Towers and Platforms	Structures that are generally not monitored by staff	Periodic direct observation of visitors by volunteers at towers and platforms. Multiply average counts per observation period by total reporting period.	Visitor Satisfaction Survey results or self-reporting on register at visitor center or visitor contact station. Calculate activity ratio and multiply by total visitors to refuge.

Table A-4 Concessions and guided activities. The left-most column identifies the facility or recreation setting. In the second column, the characteristics of the facility or setting are briefly described. The third column contains a brief summary of at least one recommended estimation method, which is considered to yield the highest quality data. The fourth column provides one or more suggestions for other methods, which are usually less expensive, but yield less data or data that may not be as reliable.

Facility or Setting	Description	Recommended Methods	Alternate Methods
A-4.1. Concessions: Guided Tours	Private firm holding special use permit or contract to conduct tours on Refuge System station	Include a reporting requirement in special use permit or contract. Concessionaire counts all persons engaged in the activity, submits monthly report to FWS.	Periodic direct observation of participants. Extrapolate total visitors from number observed per tour multiplied by days in the reporting period and tours per day.
A-4.2. Concessions: outfitted trips	Private firm holding special use permit to provide access or transportation to Refuge System station for self-guided trips, example: canoe outfitters	Include a reporting requirement in special use permit. Concessionaire counts all persons engaged in the activity, submits monthly report to FWS	Periodic direct observation of participants. Extrapolate total visitors from number observed per hour multiplied by days in the reporting period and estimated hours per day when trips are provided.
A-4.3. Aircraft taxi service to remote locations	Dispersed use associated with multiple activities, primarily in Region 7	Observations by staff in flight, in conjunction with other duties. Record planes observed on the ground or on water whenever possible. Extrapolate total number of visits from observed aircraft multiplied by number of persons per aircraft and number of days per reporting period.	Best professional judgment. Estimate number of air taxis serving general area. Estimate number of trips per operator, multiply by number of persons per trip.

Table A-5 Non-wildlife-dependent activities. The left-most column identifies the facility or recreation setting. In the second column, the characteristics of the facility or setting are briefly described. The third column contains a brief summary of at least one recommended estimation method, which is considered to yield the highest quality data. The fourth column provides one or more suggestions for other methods, which are usually less expensive, but yield less data or data that may not be as reliable.

Facility or Setting		Description	Recommended Methods	Alternate Methods
A-5.1.	Camping	Designated areas within the station, either developed with improved sites and toilets, or primitive. May be fee or non-fee.	Daily counts by staff or campground hosts.	Self-registration. Registration card completed by campers, indicating number in party, number of days on site.
A-5.2.	Picnic Areas and Day-Use Areas	Designated areas within the station, usually with tables and toilet facilities	Scheduled patrols. FWS staff or volunteers conduct regular patrols of picnic areas, count vehicles and persons. Total number of picnic visits is extrapolated from counts.	Visitor Satisfaction Survey results or self-reporting on register at visitor center or visitor contact station. Calculate activity ratio and multiply by total visitors to refuge.
A-5.3.	Boating: Refuge System Lakes	Typically conducted from designated boat launches on System lands	FWS staff or volunteers conduct regular patrols of boating access areas, count vehicles, estimate number of boaters from vehicle counts	Random checks by LE officers. Unscheduled patrols occur only when employees are available or performing collateral duty. LE officers keep log of boaters or vehicles observed, from which an estimate of total number is extrapolated.
A-5.4.	Boating: Non-System Lakes	Typically USACE lakes with refuge overlay. Boaters may access the lake either from FWS boat launches or from USACE areas	Direct count of boats in designated sectors of lake, extrapolation of total number from counts multiplied by area of lake	Correlation of data collected by state or other federal agencies for launches, lockages, permits or licenses, with an indirect indicator such as the number of boats visible at one point or number of vehicles on an access road
A-5.5.	Boating: Rivers managed by the Service	FWS stations adjacent to one or both banks of a river. Boaters may access the waterway either from FWS boat launches or from other areas upstream or downstream	Periodic direct observation of participants. Extrapolate total visitors from number observed per hour multiplied by days in the reporting period and estimated hours per day when river is used.	Self-reporting on visitor register at visitor center or visitor contact station. Calculate activity ratio and multiply by total visitors to refuge

Planning Template

Appendix B

Template for a Visitation Estimation Plan: Cover, Steps in Data Collection, Estimation Formulas, Maps, Tables, and Spreadsheets

B1. Planning Process

PLANNING PROCESS
(1) Select a general strategy
(2) Choose specific methods
(3) Prepare a written plan

A **visitation estimation program** includes all of the activities throughout the reporting cycle, from data collection to the final report at the end of the year, that are necessary to accurately estimate the number of visitors to your station and the activities that they participate in. The estimation program is developed in a three-part process.

(1) Select a general **strategy** for collecting data about visitor numbers. A strategy is a logical outline of the general approach to obtaining the necessary data. There are two basic strategies, which are discussed in detail in Chapter 2 and Chapter 3.

(2) Choose specific **methods** for collecting data about each reported visitor activity. There are several possible methods that could be applied at different steps in the application of the strategy. Recommended methods are discussed for each step in the strategies described in Chapter 2 and Chapter 3. A short summary of methods for specific applications can be found in Appendix A.

(3) Prepare a **written plan** to record the details of the methods chosen for estimating visitor numbers and to provide greater consistency in the estimation process from year to year. This Appendix contains a template that can be used as a model for a written plan.

Like all plans, the visitation estimation plan for a refuge or wetland management district must be periodically reviewed and updated.

B2. Documenting the Estimation Program

The written estimation plan is a collection of important information about your visitation estimation program, so that future managers and Service employees will be able to understand how visitor numbers have been estimated. A basic estimation plan includes the following components: cover, steps in data collection, estimation formulas, and supporting information such as maps or spreadsheets. In this section, each part of the written estimation plan is briefly described. In Section B3, the planning templates are explained.

Cover

The cover page includes the name of the station, the date of the plan, and the names of participants in the planning process. See page 61.

Steps in Data Collection

The important steps that must be documented about data collection include the specific methods used, the locations where the methods were applied, the type of data collected, and how often the methods were applied. Worksheets are provided in the planning template, to document the steps in data collection. Other important information that should be attached to the plan:

- Examples of data collection forms
- Map of data collection locations

Estimation Formulas

Estimation formulas are mathematical statements that convert the raw data collected during the year into the actual estimate or extrapolation of numbers that will be reported for Goal 5 of the Annual Performance Plan. Throughout Chapters 2 and 3, example formulas are provided. Include the following information in this section of your written plan

- *Written examples* of the formulas that you are using, including any special notes about how that formula may depend on weather or other variables
- Printed tables or reports from the *spreadsheet or database* that uses the formulas to produce the numbers that will be reported on an annual, quarterly or monthly basis

B3. Templates

Two planning templates are provided, one for refuges with where access is primarily by road (page 62) and one for remote or roadless refuges and wetland management districts (page 68). The templates are provided as a guide only. For information about the strategies for collecting data and producing estimates of visitor numbers, refer to Chapter 2 or Chapter 3.

The major steps needed to prepare a written visitation estimation plan are listed in the box below.

Checklist for Preparing a Written Estimation Plan

(1) Estimation Strategy

___ Review the recommended strategy that best describes your refuge or wetland management district:

Strategy for Refuges with Roads (Chapter 2)

or

Strategy for Remote or Roadless Refuges (Chapter 3)

(2) Cover Page

___ Prepare a cover page.

(3) Data Collection

___ Answer the questions in the template for each important step in the process of collecting data.

___ Use one of the following worksheets to document your data collection methods:

Worksheet 1 (for Documenting Routine Sources of Data)

or

Worksheet 2 (for Documenting Non-Routine Sources of Data)

(4) Attach supporting information:

___ Printed data collection forms

___ Map of data collection locations

(5) Estimation Formulas

___ Include examples of the formulas you used

___ Use a spreadsheet or database to store information

Cover

Visitation Estimation Plan

New Plan ___ or Revision ___

Station: _____

Refuge Manager or Project Leader: _____

Date Plan Completed or Revised: _____

Participants in the Planning Process: _____

_____

_____

_____

Visitation Estimation Plan on Refuges with Roads

Station: _____Date Completed:_____

Part 1 – Steps in Data Collection

Step 1

Use traffic counters to count visitors' vehicles at one or more locations.

Number of Traffic Counters in Operation: _____

If no traffic counters are in operation, skip to Step 5.

	Location	Type of Counter
1.		
2.		
3.		

Step 2

Use direct observations to calibrate each traffic counter.

Traffic Counters Calibrated this Year?

___ Yes ___ No

Calibration Factors Used

	Vehicles per Click	Persons per Vehicle	Other
1.			
2.			
3.			

Step 3

Estimate the percentage of vehicles entering the refuge that are not recorded by traffic counters.

Are all entrances monitored by traffic counters?

___ Yes ___ No

If "yes", skip to Step 5.

If "no", were observations conducted this year to estimate the percentage of vehicles not recorded by traffic counters?

___ Yes ___ No

If "no", when were observations last conducted? _____

Step 4

Calculate a Correction Factor

What is the correction factor to account for vehicles not recorded by traffic counters?

Correction Factor: _____

(Correction factor = Total Vehicles / Traffic Counter Vehicles)

Step 5

Collect information about the numbers of visitors participating in specific activities at designated visitor use areas.

Was information collected this year about visitor activities?

___ Yes ___ No

To document the sources of information, complete Worksheet 1 and attach it to the plan.

Step 6

Calculate or estimate the activity ratio for each educational or recreational activity.

What methods are used to estimate visitor participation in activities?

___ Yes ___ No Activity Ratios

___ Yes ___ No Traffic counters at specific areas or facilities

___ Yes ___ No Head-counts of participants

If "yes", enter value and source (observation, guest register, survey, professional judgment, traffic counter, head count) for each activity ratio.

Activity	Activity Ratio	Source of Information
Visits to Visitor Center or Contact Station		
Hunting		
Fishing		
Wildlife Observation		
Photography		
Environmental Education		
Interpretation		
Other		

Part 2 – Supporting Information

Are the visitation data compiled in a spreadsheet or database?

___ Yes ___ No

If "yes", what is the file name and where is it stored (name of workstation, server, *etc.)*?

File name: _____

Location: _____

	Attached? (✓ if "yes")	**Last Updated?**
Worksheet 1?		
Schedule of data collection?		
Examples of data collection forms?		
Map of data collection locations?		

Part 3 – Estimation Formulas

Use separate sheets to provide **written examples** of the formulas used for estimating visitor numbers, including any special notes about how that formula may depend on weather or other variables.

Attach printed tables or reports from the **spreadsheet or database** that uses the formulas to produce the numbers that will be reported on an annual, quarterly or monthly basis.

Worksheet 1: Documenting Sources of Data for Visitation Estimation

Instructions for Completing Worksheet 1

1. Under “Methods/Instruments”, tell how data were collected for each activity reported in the Annual Performance Plan. Methods include: traffic meter, direct observation, patrol, self-registration, fee collection. Examples of instruments: “passive infrared traffic counter,” “iron ranger,” or “Visitor Satisfaction Survey.”

2. For “Locations”, list the areas or facilities on the station where the method is used to collect data about the reported activity.

3. Under “Data Collected” list the actual information that is gathered using the methods indicated in the first column. Example: number of vehicles.

4. For “Sample Schedule”, write a short description of how often and when data are collected using the methods indicated. Examples: “daily,” “once per month,” or “first two weeks in September.”

Worksheet 1 for Documenting Routine Sources of Data

Station: _____ Completed by: _____ Date: _____

Activity Reported	Method(s) or Instrument(s)	Locations	Data Collected	Sampling Schedule
Participants in Special Events *Specify:*				
Visitor Center or Contact Station Visits				
Hunting: *Waterfowl*				
Hunting: *Other migratory birds*				
Hunting: *Upland game*				
Hunting: *Big game*				
Fishing: *Freshwater*				
Fishing: *Saltwater*				
Fishing: *Estuarine*				
Foot Trails				
Auto Tour				
Boat Trails/Launch				
Photo Blinds				
Other Photography *Specify:*				

Worksheet 1 for Documenting Routine Sources of Data

Station: _____ Completed by: _____ Date: _____

Activity Reported	Method(s) or Instrument(s)	Locations	Data Collected	Sampling Schedule
EE Programs: Teachers Participating on-Site				
EE Programs: Teachers Participating Off-Site				
EE Programs: Students Participating on-Site				
EE Programs: Student Participating Off-Site				
Participants on-Site: Staff/Volunteer-Led Interpretive Programs				
Participants off- Site: Staff/Volunteer Led Interpretive Programs				
Trapping				
Bicycling				
Camping				
Swimming				
Motorized travel by boat (non-wildlife dependent)				
Non -motorized boat travel (non-wildlife dependent)				
Other Recreational Visits *Specify:*				

Visitation Estimation Plan for Remote or Roadless Refuges and Wetland Management Districts

Station: _____Date Completed: _____

Part 1 – Steps in Data Collection

Step 1

Whenever possible, follow a schedule for observing and recording the number of participants in educational or recreational activities.

Identify (✓) types of data collected about visitor activities this year.

Type of Data Collected	✓
Head count at programs?	
Traffic counters?	
Planned patrols?	
Self-registration at trails?	
Guest register in visitor center?	
Surveys?	
Outfitter reports?	
Reports by other agencies?	
Other:	

Attach a schedule of observations, or describe how the observations are collected routinely.

Step 2

Collect non-routine observations when possible.

Are observations of visitors' activities reported by law enforcement officers, biologists, other employees or volunteers whenever they are out on the refuge or wetland management district?

___ Yes ___ No

Step 3

At the end of the reporting cycle, compile all observations.

For routine observations, assemble printed copies data sheets, outfitter reports, and other documentation.

For other information, complete Worksheet 2 and attach it to the plan.

Steps 4 and 5

Calculate the total number of visits for each public education or recreation activity from the total number actually recorded.

When it is not possible to collect observations and there are no other sources of data for estimation, the manager can use best professional judgment

For each category of educational or recreational activities, indicate (✓) whether the estimate is based on observation (O), extrapolation (E) from limited data, or best-professional judgment (J).

Activity	O?	E?	J?
Visitor Center or Contact Station			
Hunting			
Fishing			
Wildlife Observation			
Photography			
Environmental Education			
Interpretation			
Other Activities:			

Part 2 – Supporting Information

Were data compiled in a spreadsheet or database?

___ Yes ___ No

If "yes", what is the file name and where is it located (name of workstation, server, directory, *etc*

File name: _____

Location: _____

	Attached? ✓ if "yes"	Last Update?
Worksheet 2?		
Schedule of data collection for traffic counters, routine observations and patrols?		
Map of patrol routes for waterfowl production areas or other areas?		
Examples of data collection forms?		

Part 3 – Estimation Formulas

Use separate sheets to provide **written examples** of the formulas used for estimating visitor numbers, including any special notes about how that formula may depend on weather or other variables.

Attach printed tables or reports from the **spreadsheet or database** that uses the formulas to produce the numbers that will be reported on an annual, quarterly or monthly basis.

For estimation based on non-routine or occasional observations, use Worksheet 2 to document the data used in Formulas 3.2 and 3.3 (Chapter 3.)

Worksheet 2: Documenting Sources of Data from Non-Routine Observations

Instructions for Completing Worksheet 2

If you are using this worksheet, it is assumed that one of your primary methods of estimating visitor numbers is either occasional observations or professional judgment (*Workbook* Chapter 3).

1. Record the total number of visitors observed during the past year for this particular activity.

2. Record the total number of separate observations taken during the past year that produced the results for (1). For example, if the number of anglers was counted at one different location ten times during the year, the number of observations would be ten. If enough data were collected to do so, group the observations by location, for example, if the number of anglers was counted five times at each of two locations.

3. Estimate the number of days during the past year when the activity was likely to have occurred.

4. Estimate the number of similar specific locations or general areas where the activity could reasonably be expected to occur *at the same time*. An "area" could be a single valley, a stretch of river known to be popular with anglers, or an entire watershed.

Worksheet 2 for Estimation Using Non-Routine Observations

Station: _____ Completed by: _____ Date: _____

Activity Reported	Number of visitors observed?	Number of observations?	Days per year?	Number of locations or areas?
Participants in Special Events *Specify:*				
Visitor Center or Contact Station Visits				
Hunting: *Waterfowl*				
Hunting: *Other migratory birds*				
Hunting: *Upland game*				
Hunting: *Big game*				
Fishing: *Freshwater*				
Fishing: *Saltwater*				
Fishing: *Estuarine*				
Foot Trails				
Auto Tour				
Boat Trails/Launch				
Photo Blinds				
Other Photography *Specify:*				

Worksheet 2 for Estimation Using Non-Routine Observations

Station: _____ Completed by: _____ Date: _____

Activity Reported	Number of visitors observed?	Number of observations?	Days per year?	Number of locations or areas?
EE Programs : Teachers Participating on-Site				
EE Programs: Teachers Participating Off-Site				
EE Programs: Students Participating on-Site				
EE Programs : Student Participating Off-Site				
Participants on-Site: Staff/Volunteer-Led Inter-pretive Programs				
Participants off- Site: Staff/Volunteer Led Interpre-tive Programs				
Trapping				
Bicycling				
Camping				
Swimming				
Motorized travel by boat (non-wildlife dependent)				
Non -motorized boat travel (non-wildlife dependent)				
Other Recreational Visits *Specify:*				

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