Purpose
The purpose of this training resource is to provide a guide to how to use SMART software for data management in the field. The intended target groups for training are administrators and data managers who work on site in protected areas, community conservancies, private reserves and other conservation areas, and those based out of regional or national offices of relevant management agencies.

Acknowledgements
The training handbook was prepared by the SMART Training Taskforce, a group of dedicated SMART users who work very broadly across geographic regions, sites and situations where SMART is being implemented, in terrestrial and marine environments. The Training Taskforce is one working group under the SMART partnership which currently comprises the following organizations; Frankfurt Zoological Society, Global Wildlife Conservation, North Carolina Zoo, Panthera, Peace Parks, Wildlife Protection Solutions, WCS, WWF, and ZSL.

Overview
This training resource covers the theory and practice of data management under the SMART approach. The first section of the handbook introduces the rationale for law enforcement monitoring and the use of field patrol data for decision-making and adaptive management. It goes on to discuss information needs for the manager and relevant types of data that can provide such information, and why SMART is a tool of choice for data management. The second and third sections of the handbook demonstrate how to set up and manage a SMART database in the context of day-to-day use at the conservation site. Examples from some of the >1000 SMART implementation sites are used to provide context. In the fourth section, core tasks for ensuring SMART can be a functioning tool for adaptive management are presented.

Photo Credits:
Cover Image: © Richard Bergl | North Carolina Zoo
# Table of Contents

Purpose .................................................................................................................................................. 1  
Acknowledgements ................................................................................................................................. 1  
Overview ................................................................................................................................................ 1  

1. Introduction: the SMART approach for Law Enforcement Monitoring (LEM) .................................. 4  
   1.1 What is SMART? ................................................................................................................................. 4  
   1.2 What data to collect? Why? .................................................................................................................. 5  
   1.3 What is the benefit of having geo-referenced data? ............................................................................. 5  
   1.4 Importance of data management ........................................................................................................ 5  
   1.5 Data quality and why it’s important ..................................................................................................... 5  
   1.6 Information needs for the implementing agency .................................................................................. 5  
   1.7 Why SMART? Reasons for choosing SMART over other LEM monitoring tools .............................. 6  

2. Using SMART for patrol data management ......................................................................................... 6  
   2.1 Who should use the SMART software? .............................................................................................. 6  
   2.2 Where should the SMART database be located? ................................................................................ 6  
   2.3 Recommended operating systems for use with SMART ...................................................................... 6  
   2.4 Getting started - downloading the SMART software .......................................................................... 6  
   2.5 Setting up a SMART database ............................................................................................................. 7  

2.6 Data models ......................................................................................................................................... 11  
   2.6.1 Default data model ........................................................................................................................... 11  
   2.6.2 Customizing data models ................................................................................................................ 11  
   2.6.3 Configured data models for mobile data collection ......................................................................... 12  

2.7 Defining parameters for staff and infrastructure .............................................................................. 12  
   2.7.1 Entering Agencies and Ranks .......................................................................................................... 12  
   2.7.2 Defining employees ......................................................................................................................... 14  
   2.7.3 Entering Conservation Area Employees ......................................................................................... 14  
   2.7.4 Importing Employees ..................................................................................................................... 16  
   2.7.5 Entering Stations ............................................................................................................................ 17  

2.8 Patrol characteristics ............................................................................................................................ 18  
   2.8.1 Defining Patrol Types ..................................................................................................................... 18  
   2.8.2 Defining Patrol Mandates ............................................................................................................... 20  
   2.8.3 Defining Patrol Teams .................................................................................................................... 21  
   2.8.4 Managing Patrol Options ................................................................................................................ 21  

2.9 Creating maps of the conservation area ............................................................................................ 23  
   2.9.1 Defining Conservation Area Boundaries ....................................................................................... 23  
   2.9.2 Add New Layers ............................................................................................................................. 26  
   2.9.3 Changing map projections ............................................................................................................. 27  
   2.9.4 Save a Basemap .............................................................................................................................. 30
2.9.5 Setting a Saved Basemap ........................................................................................................ 30
3. Managing a SMART database ........................................................................................................ 31
  3.1 Entering patrol data ...................................................................................................................... 32
    3.1.1 Patrol Perspective .................................................................................................................. 32
    3.1.2 Manual Patrol Data Entry using GPS and Tracklogs ............................................................. 32
    3.1.3 Waypoints ............................................................................................................................ 37
    3.1.4 Setting Tracks ...................................................................................................................... 42
    3.1.5 Entering Observations .......................................................................................................... 43
    3.1.6 Importing CyberTracker Patrols into SMART .................................................................... 46
    3.1.7 Importing Patrols from other sources .................................................................................. 48
    3.1.8 Patrol Perspective - Map ..................................................................................................... 50
    3.1.9 Information Tool ................................................................................................................... 53
  3.2 Conducting question-driven basic analyses ................................................................................. 54
    3.2.1 Definitions ............................................................................................................................ 54
    3.2.2 Query and Summary Components ...................................................................................... 55
    3.2.3 All data observation query ................................................................................................ 57
    3.2.4 All data incident query ........................................................................................................ 63
    3.2.5 Patrol Query ........................................................................................................................ 64
    3.2.6 Patrol Observation and Incident Queries ............................................................................. 66
    3.2.7 Exporting Query Results .................................................................................................... 73
    3.2.8 Summary queries .................................................................................................................. 73
    3.2.9 Exporting Summary Query Results .................................................................................... 81
    3.2.10 Exporting and Importing Query Templates ..................................................................... 81
    3.2.11 Gridded Query .................................................................................................................... 83
    3.2.12 Importing Queries and Summaries ................................................................................... 89
  3.3 Overview of reports ...................................................................................................................... 93
    3.3.1 Viewing and running reports .............................................................................................. 93
    3.3.2 Exporting Reports ............................................................................................................... 94
    3.3.3 Report Definition ................................................................................................................ 94
    3.3.4 Importing Reports .............................................................................................................. 96
4. Using SMART for adaptive management; tasks for the data manager ............................................... 97
  4.1 Ensuring data comes in on time ................................................................................................. 97
  4.2 Ensuring basic analysis done on time ....................................................................................... 98
  4.3 Ensuring reports produced on time ........................................................................................... 98
Annex 1: Sample pages-SMART monthly report, Keo Seima Wildlife Sanctuary, Cambodia ............... 99
Annex 2: Flow chart of SMART data collection, reporting & management in Bangladesh Sundarbans Reserve Forest.......................................................... 101
1. Introduction: the SMART approach for Law Enforcement Monitoring (LEM)

1.1 What is SMART?
The Spatial Monitoring and Reporting Tool (SMART) is designed to improve anti-poaching efforts and overall law enforcement effectiveness in established conservation areas and management zones. SMART enables the collection, storage, communication, and evaluation of data on: patrol efforts (e.g., time spent on patrols, areas visited, distances covered), patrol results (e.g., snares removed, arrests made), threat levels, and other enforcement activities. The “SMART Approach” combines the cutting edge site based management tool with capacity building and a set of protection standards. When effectively employed to create and sustain information between ranger teams, analysts, and conservation managers, the SMART Approach can help to substantially improve protection of wildlife and their habitats.

The SMART Approach for law enforcement monitoring involves a five-step process starting with the collection of field data by ranger patrols through to decision-making and strategic planning.

- **Ranger patrols** - Patrol teams collect and record data on where they go and what they see, such as human activities (e.g., signs of poaching, habitat encroachment, timber cutting), interventions (e.g., arrests, issuing of fines, confiscations of weapons and other restricted or banned equipment), observations of wildlife and habitat features.

- **Data input** – Patrol teams report their patrol activities, and patrol data and routes are checked and then stored in the SMART patrol database.

- **Analysis and reporting** - Data are processed into highly visual tables, charts, and maps showing patrol effort, coverage, and results, forming the basis for patrol analysis and evaluation.

- **Feedback and evaluation** - Regular meetings with rangers are held to discuss patrol effort and results to ensure all stakeholders are kept informed and to demonstrate the value of ranger efforts.

- **Strategic planning** - Managers, rangers, and other stakeholders plan adaptive patrol strategies based on analysis of previous results and set new patrol targets.
1.2 What data to collect? Why?
Data collected by field teams should have inherent value for the management of the conservation area. Valuable data will include observations of wildlife, human activities both legal and illegal, the condition of natural features including feeding, breeding and roosting areas, and movements and activities of patrol teams. Data should be recorded accurately and honestly so that decisions made on the basis of the observations are the most informed decisions possible.

1.3 What is the benefit of having geo-referenced data?
In order for managers to understand the distribution of threats and wildlife inside the conservation area, and where needed direct field teams to take appropriate follow-up action, observations collected by patrol teams need to be geo-referenced. This means that each observation has a location and time attached to it that makes it possible to plot the observation onto digital maps of the conservation area. The quickest most accurate way to do this is by using a dedicated Global Positioning System (GPS) device or a handheld device with GPS function. As such the GPS is an important tool for information or intelligence-led patrolling.

1.4 Importance of data management
Increasing threats to wildlife and habitats puts increasing pressure on managers to respond with the right decisions in a time efficient manner. Ranger teams need to be deployed to threat hotspots so they can arrest poachers, detect snares and traps and prevent wildlife crime from happening thus saving the lives of animals. To ensure this happens, accurate and honest data should be recorded by rangers in the field, and this data needs to be turned into information in as close to real time as possible. Patrol data may not be the only kind of data used to make decisions. Data managers may also work with data from other sources such as intelligence, reports from tourists and tour operators, and information from camera-traps, acoustic devices, drones and other surveillance equipment.

1.5 Data quality and why it’s important
Data managers play an important role in verifying good quality data and filtering out poor quality data. Only good quality data can be included in basic analyses (queries and summaries) and reports to the manager. Working with patrol team leaders, data managers need to verify the locations and times of observations of human activities recorded by patrols, and confirm any unusual observations, such as records of endangered species, or details of enforcement interventions, infractions recorded, and actions taken. Poor quality data should be addressed by conducting training or refresher training as needed to upgrade skills, and by using various approaches to motivate rangers to achieve a higher level of performance.

1.6 Information needs for the implementing agency
SMART is currently implemented across >800 sites across >60 countries with 115 government partners, and is increasingly scaled from sites to networks, with 14 countries now adopting SMART at the national level. Each agency has its own needs for information that can help effective park protection and management, monitoring of endangered species and threats. For example, managers of National Parks...
and Marine National Parks require information on human impacts in order to implement plans for managing recreation areas and other managed use zones. Wildlife Sanctuaries and Game Reserves are set up to protect focal species so managers require information on the distribution of those species and the spatial and temporal distribution of threats to wildlife and their habitats. Community conservancies are established to manage human use of lands, so managers need to assess impacts on natural resources that may be used by local people.

1.7 Why SMART? Reasons for choosing SMART over other LEM monitoring tools
SMART is the world’s leading tool for conservation law enforcement monitoring (LEM) and protected area management. SMART LEM enables the collection, storage, communication, and evaluation of data on patrol efforts, patrol results, and threat levels, along with feedback from decision-makers to the frontline. Data can be collected using paper forms plus a GPS, or via handheld digital devices. Available in multiple languages, data analysis is facilitated by an easy to use query wizard. Implementation of SMART LEM has enhanced law enforcement effectiveness, improved morale of protection teams, and reduced threats to wildlife and other natural resources at numerous sites across the world. When effectively employed to create and sustain information flow between rangers and conservation managers as part of the SMART Approach, SMART LEM will help to substantially improve protection of wildlife and their habitats.

2. Using SMART for patrol data management
2.1 Who should use the SMART software?
Using the SMART database is the task of the person or persons who are responsible for data or information management in the conservation area or cluster of conservation areas. There are four types of tasks for SMART users, all of whom will work out of administrative offices at or near the site, or in a regional office;

- Data entry – collating data from field patrol records and entering into the database
- Analysts – conducting basic analysis of data and producing reports
- Managers – using results of analysis and reports to make decisions
- Administrators – responsible for day-to-day management of SMART database including data collection and entry, analysis, and reporting.

2.2 Where should the SMART database be located?
A SMART desktop database should ideally be located where decisions are made about deploying resources for patrolling and monitoring i.e. where the manager is based.

- In small conservation areas the SMART database would normally be located on a central computer at headquarters or other administrative office to which ranger teams report to on a regular basis.
- In large conservation areas, there may be sub-offices or stations from which ranger teams operate. If there is a source of power available, a copy of the SMART database can be maintained at each post for managing data coming in from that particular patrol sector or management zone.

2.3 Recommended operating systems for use with SMART
Windows: SMART works with any version of Windows OS from 7 through 10.

Mac OSX: It is recommended to use El Capitan, Sierra, High Sierra, Mojave, or Catalina (10.11.x – 10.15.x) with SMART.

2.4 Getting started - downloading the SMART software
Once you have decided to move ahead with using SMART, the first step is to download the software at smartconservationtools.org. At this website you will click Download SMART 6 or navigate to the 'Downloads' tab. There are four versions of the software available for different operating systems, be sure to download the right version for your computer; Windows 64-bit, Windows 32-bit, MacOS or Linux. SMART can be downloaded from the website here: www.smartconservationtools.org
Depending on the speed of your internet connection, the download process could take a few minutes or more to complete. The result will be a zipfile containing the program files downloaded to the Downloads folder on your computer.

Windows download: Double-click on the zipfile icon to begin the file extraction process. This will create a folder called ‘smart’ at a location of your choice. A good way to do this is to create a new folder called ‘Programs’ in hard drive C or D. Then extract the SMART program folder and its contained files there using WinZip or another similar program. Rename the folder SMART 6. Inside the new folder, select the smart.exe file, right click and create a shortcut to the program on the desktop.

Mac OS download: Move the zipfile to the location where you want the SMART folder to be. Double-click on the zipfile icon and the system will create a folder called ‘smart’. Rename the folder SMART 6. Inside the new folder, select the SMART program file, right click and create an alias of the program then move it to the desktop.

With the software installed, in the next sections (2.5 – 2.6) users will be familiarized with the initial steps for creating a new database, how to set the username and password for access, and how to select the data models.

2.5 Setting up a SMART database
Double-click on the SMART icon on the desktop to open the program. The first screen you will see is the startup screen which looks like this.

From the startup screen you have the choice of selecting one of the databases (Conservation Area). For example if you want to conduct an orientation or training exercise you could select the ‘SMART – Example
Conservation Area’. Type in ‘smart’ and ‘smart’ as username and password respectively, and this takes you to a sample database that contains some dummy parameters, a default data model, patrol data, queries and summaries, and reports.

Alternatively select ‘Advanced’ if you want to do any of the following three things:

- Create a new conservation area – select this option if you want to setup a new database from scratch
- Upgrade and restore a backup – select this option if you have an existing backup in a previous version of SMART (v3.3-6.2) that you want to upgrade
- Import a conservation area – select this option if you have a backup of a conservation area from another SMART instance (v6.3) that you want to bring into your new database

After selecting ‘Create a New Conservation Area, you may choose between creating a blank conservation area or one based on the template of an existing conservation area in the database. If creating a blank conservation area, you then need to define the name and identifier and other descriptors for the new database. For the purpose of the instructional exercise in this handbook, we will use ‘SMART’ as the identifier.
It is recommended to keep the fallback language of SMART as English when creating a new Conservation Area, then add any local native language as a supported language.

There is a way to force SMART to startup in a language that is not the system language of Windows. It involves adding a new line in the 'SMART.ini' file located in the same folder as the 'SMART.exe' file we use to launch the program. You need to add the following line at the end of the 'SMART.ini' file (including the -):

-Duser.language=en

Replace 'en' with the 2-letter ISO code for the language of your choice (e.g. ru for Russian, fr for French).

It should look like this:
Then enter the first and last name of the individual who will administer the database. This is the person who is assigned responsibility for managing the database. The administrator has permissions to enter data, make changes to the data, conduct analysis, create reports and perform all functions. Assign and username and password and click finish to create the new conservation area.

In the next sections (2.6 – 2.9) the user will follow a series of steps to set up the parameters for the database making it ready for use. Users will draw from a set of support files that come with the training package.
2.6 Data models

The data model is at the core of all SMART processes, from data collection through analysis and reporting. Considerable thought should go into designing a data model that captures all the details that are needed now, or might be needed in future, to create information useful for the management of the conservation area. It is recommended that a workshop be held to seek inputs from senior managers on what data categories and attributes are required, and to develop an outline of what the data model should look like. This is especially important where SMART will be setup across multiple conservation areas, so the data model of sites within the network should be roughly similar, except for variation in local environmental characteristics such as localities where people are encountered, species lists, and natural features.

2.6.1 Default data model

The default data model comes built-in to the SMART software, and is the version found in the Example Conservation Area. Select Conservation Area > Data Model. If you are creating a new conservation area, you have to additionally select ‘Use default data model’ to install the default.

The default data model is made up of four broad categories, and various attributes contained within each category:

1. Human activity - information on threats requires field teams to record observations on human activity including details of persons encountered, signs of human activity, camps, vehicles, weapons and equipment, transportation, timber, non-timber forest products, domestic animals, fire, land clearance, roads, mining and pollution.

2. Wildlife - information on wildlife will be based on direct and indirect observations of animals, carcasses, animal parts and bushmeat.

3. Natural features – information on the condition of resources used by wildlife such as water holes, mineral licks, caves, and fruiting trees may be recorded, including evidence of the species using them.

4. Patrol movements – movements of the field teams making the observations may be recorded including start and end points of patrols, places where patrols stop temporarily, where changes in transport take place, and where camps are made.

2.6.2 Customizing data models

The default data model is intended as a template that can be adapted for use with a new database by disabling or removing categories, or adding new categories. Under each category are found a set of data attributes. Attributes take the form of numbers, text, lists, trees, etc. These too may be disabled, or removed, and new attributes added. Alternatively, an existing data model from another conservation area in the database may be used, or imported as an XML file.
Note: In the support files, Module 1 two data models are provided, one for use in African sites, one for Asia sites. In the practice example below we will use the African data model

- Select Conservation Area > Data Model
- Select Import XML file at the bottom of the window, then Module 1 > Datamodel_Africatraining

### 2.6.3 Configured data models for mobile data collection

Another important task of the Administrator is the design of the format for collecting data that will be used by field teams; the configured data model. This is based on the data model for the conservation area. For example, patrol teams with a law enforcement mandate focus on collecting data on illegal human activities. Community teams may focus on collecting data on human activities that threaten natural resources or other values of the conservation area. Research and monitoring teams may focus on recording observations of wildlife. For each mandate a configured data model can be designed for recording field observations for export to handheld devices via Cybertracker / SMART Mobile. Configured models designed in an existing conservation area can be exported as an XML file, then imported into your new database.

**Patrol objectives and data models from SMART implementation sites**

At Glovers Reef in Belize, a marine protected area, patrols are done by boat with the primary focus to stop illegal activities impacting near-shore coral reefs and in offshore waters. The data model reflects the range of human impacts encountered including illegal fishing, harvest of turtles and other marine animals, use of prohibited gears and illegal intrusions.

In the Bangladesh Sundarbans Reserve Forest, forest department patrols focus on stopping poaching and illegal fishing. Patrol teams operate from boats with patrols done along channels or in open water, or by foot in tidal areas within the mangrove. The data model reflects a wide range of human activities that rangers record including illegal intrusion, fishing, honey collection, palm leaf collection, timber cutting, poaching, and pollution. Wildlife, fish and crabs are all recorded with species names as are specific methods of harvesting used to catch these resources.

At the Kuku Group Ranch in Kenya, rangers employed by the Maasai Wilderness Conservation Trust conduct patrols aimed at managing livestock grazing by local people and stopping poaching and illegal timber cutting by outsiders. All patrols are on foot based from ranger stations located around the perimeter of the conservation area. The data model emphasizes the range of human activities and large mammals, including lions and elephants, that are targets for poaching.

Further details on designing and editing data models and configured data models can be found in the Advanced Administration with SMART Connect Training Handbook.

### 2.7 Defining parameters for staff and infrastructure

Aside from the data model the metadata associated with the field teams that are deployed to collect SMART data need to be defined. This is done under the Conservation Area tab. Agencies and ranks of employees, names of field stations, patrol types and transport, and patrol mandates can be entered here. These parameters will usually be defined once when the conservation area is setup and then not changed again.

#### 2.7.1 Entering Agencies and Ranks

Employees working within a Conservation Area, and SMART users, may belong to a particular agency, and may have a rank within that agency.

As part of the initial setup of a Conservation Area, the list of Agencies and their associated Ranks is accessed through the menu “Conservation Area - Agency and Rank List …”
Note: Agencies are defined first because Ranks are always associated with an Agency. Be careful to enter the agency names exactly as given below as we will be using them later!

In the menu bar …

- Click **Conservation Area … Agency and Rank List**

- Click **Add** under Agencies
- Double-click on **New Agency**
- Enter **National Park Department**
- Click **Add** under Ranks
- Double-click on **New Rank**
- Enter **Ranger**
- Click two more times on **Add under Ranks**
- Replace New Rank with **Patrol Leader** and **Patrol Warden**
- Click **Save**
Close

**Note:** All entries can be edited by double-clicking on the name and retyping in new values. Agencies and Ranks can be deleted by clicking the Delete button. Additionally, there is an option to import and export, which is useful when creating a new conservation area that uses the same set up.

### 2.7.2 Defining employees

The personal data and affiliations of employees involved in data collection and management need to be entered. As staff begin and end their terms of employment, dates of hiring and termination are added to individual records. As staff may be constantly turning over this part of the database requires periodic updates. Employees can be assigned SMART related tasks (data entry, analysis, manager, administrator). For example, some patrol leaders might be assigned the responsibility to enter data. This might be important where teams work in remote areas, so they can update their patrol data as it comes in rather than waiting until the end of the month to bring it to the park admin office.

### 2.7.3 Entering Conservation Area Employees

In the menu bar …

- Click **Conservation Area … Employee List**

The current Employee List contains the single administrator account that was created during the initialization of the Conservation Area. Additional employees of a Conservation Area can be entered individually, or through a bulk upload process.
The “Create New...” button will bring up the same form that was used to create the primary administrator’s account during the setup of the new conservation area. New employees can be entered into the system using this form.

- Click **Create New ...**

Enter in the following employee information

- **Given name(s):** Choose the name of a ranger from your site
- **Family name(s):** Choose a name
- **Conservation Area Start:** \(<\text{today’s date}>\)
- **Birth Date:** \(<\text{choose a date}>\)
- **Gender:** \(<\text{choose one}>\)
- **Agency:** National Park Department
- **Rank:** Ranger
- **Save**
Repeat these steps to add another 2 rangers, a patrol leader and a patrol warden.

Note: If you make any mistakes or want to make any changes to the Employees created, just highlight the applicable row, select Edit, make the required changes and select Save.

2.7.4 Importing Employees

The second method of populating the list of employees for a Conservation Area is to import an existing employee list. This is also done in the Employee List page.

The “Import...” function will import a CSV file and auto-populate the Employees List.

The CSV file must have the following format:

ID, GIVEN NAME, FAMILY NAME, BIRTHDATE (yyyy-mm-dd), GENDER (M/F), START EMPLOYMENT (yyyy-mm-dd), END EMPLOYMENT (yyyy-mm-dd), AGENCY, RANK

Note: If the Agencies and Ranks data has not yet been populated, then it will not be possible to assign an Agency or Rank to that employee at this point.

If the employee is also a user of the SMART software, the form will allow for the creation of a SMART account. The parameters for a username, password and account privileges are entered in at this point.

Edits to employee details or SMART account settings can be done at any point but must be done via an administrator account.

On the list of employees, click **Import ...**

- Check **Includes Header Line (skip the first line when importing)**
- Click **Browse**
- In the Support files folder **Module 1** select **SMART_Employees.csv**
- Click **Open**
- Ensure the Delimiter is “comma (,)” then click **Import**
- A confirmation will be shown in a pop-up window after a successful import
- Click **OK** on the Import Employees pop-up
- Click **Close** on the Employee List pop-up

After the import, you should have all of the new employees entered into the database for this Conservation Area.

### 2.7.5 Entering Stations

Another part of the initialization process is defining the list of stations that are used by employees to start their patrols.
In the menu bar …

- Click Conservation Area … Station List
- Click Add
- Double click to change New Station to HQ
- Click in the Description cell for HQ
- Type in Headquarters
- Add two more Stations using the same process:
  
  - Name - Description
    - Patrol station 1
    - Fixed patrol post 1
  
- Save and Close

2.8 Patrol characteristics
Under the Patrol tab, the mandates of patrol teams, types of patrols, and names of patrol teams are entered. These characteristics may be somewhat fixed meaning that there are only certain types of patrols done due to terrain and available resources e.g. foot, vehicle, boat, and patrol mandates are set e.g. law enforcement, research and monitoring etc. The names of patrol teams may change and new teams may be added depending on available budgets and staffing.

2.8.1 Defining Patrol Types
Patrol Types help define the mode of transportation used for the patrols. The Patrol Types are defaulted to Air, Ground and Water. The subtypes or “Transportation Options” define the various forms of transportation used for each of the three Patrol Types. The “Add” button will allow administrative users to add new Transportation Options for the three Patrol Types of Air, Ground and Water.
Click **Patrol … Patrol Types** from the Main Menu Bar
- Navigate to the **Patrol Types** tab to see what type of patrols exist
- Navigate back to **Transportation Options**

<table>
<thead>
<tr>
<th>Transport Type</th>
<th>Patrol Type</th>
<th>Active</th>
<th>Maximum Speed (km/h)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Air</td>
<td>Active</td>
<td>500</td>
<td></td>
</tr>
<tr>
<td>Ground</td>
<td>Active</td>
<td>120</td>
<td></td>
</tr>
<tr>
<td>Water</td>
<td>Active</td>
<td>70</td>
<td></td>
</tr>
</tbody>
</table>

- Click the **Add** button, a row is added to the Transportation Options section with default text **New Transport Type in the Transport Type column**
- Double click the **New Transport Type** text and type **Foot** to replace default text
- Make sure the Patrol Type is **Ground**

*Note: the Key will be automatically generated.*
- Click the **Add** button to add another entry to Ground Patrols
- Type in **Vehicle**
- Click **Save**
- Click **Close**

**Maximum Speed for Valid GPS points**

This setting can be found in the **Patrol Types** tab and will help reduce errors in GPS data points by filtering out data points where the calculated speed exceeds the values in the Patrol Types.

*Note: You can Disable and Enable patrol and transport types in order to simplify the process of creating a patrol e.g. a conservation area may never run water patrols therefore this option can be disabled.*

**2.8.2 Defining Patrol Mandates**

Patrol Mandates state the general objective of a patrol and require the administrator to define the entries. These are assigned to each patrol in order to categorize patrols according to their objective, which will facilitate analysis by patrol objective.

- Click **Patrol … Patrol Mandates** from the main Menu Bar.

*Note: the Key will be automatically generated.*

- Click the **Add** button
- Double-click the **New Patrol Mandate** text in the **Mandate** column.
- Type in **Surveillance**
• Add 3 more Mandates
  o Anti-poaching
  o Follow-up
  o Research and Monitoring

• Click Save
• Click Close

2.8.3 Defining Patrol Teams
Patrol Teams indicate the name and mandate of the team and are assigned to each patrol. To create a new patrol team:

• Click Patrol … Patrol Teams from the main Menu Bar
• Click Add
• Click the New Team entry and type in Mobile Team 1
• Select the Mandate Anti-poaching by double-clicking on the Mandate field
• Click Add
• Click the New Team entry and enter Mobile Team 2
• Select the Mandate Anti-poaching
• Click Add
• Click the New Team entry and enter Community Team 1
• Select the Mandate Research and Monitoring
• Click Save
• Click Close

2.8.4 Managing Patrol Options
Managing Patrol Options allows the Administrator to specify a time period (in days) for how long after a Patrol was entered that the users can edit the Patrol information. Selecting ‘Field Data’ at the top of the menu and then selecting ‘Field Data Options’ will allow you to access these options.
-1 in Edit Options indicates that there is no time limit for editing patrols.

Another parameter on this screen is whether to collect distance and direction information. For example, a Conservation Area manager may wish to have rangers record an observation that was seen, say, “500 metres to the North-East”. For the purposes of this training module, you will leave the default settings, so simply click Close.

**Patrol characteristics from different SMART implementation sites**

In the Bangladesh Sundarbans mobile patrol teams managed by the Forestry Department operate from a set of forest stations that are in strategic locations across a very large (6,000km²) area. The teams use several types of boats including launches, dinghies and fibre-body outboards. When budgets permit patrolling is done by each team a few times per week. For safety team size is usually 5-6 staff.

The Kuku Group Ranch in Kenya is protected and monitored by 101 employed Community Rangers, the majority of whom are illiterate. Foot patrol teams usually 2-3 in size operate from ranger stations on the perimeter of the conservancy. In 2015 patrols were carried out on 8 of 10 days.
Selva de Florencia National Park in Colombia has 13 rangers who carry out on average 25 foot patrols per month, according to the management plan of the area and the control and surveillance program. Patrols do not cover the entire protected area (10,019 hectares) due to restrictive terrain.

2.9 Creating maps of the conservation area
Inside the SMART software is a basic mapping and navigation tool. When you login to the conservation area the first page you will see is the map and navigation page. From this page you will import spatial boundaries as shapefiles taken from your sites GIS database. You may import up to five sets of boundaries, each of which may be renamed and edited as desired. Layers associated with imported boundaries may be used as filters in queries. For example, you might want to know the number of incidents of poaching inside each management sector (core, buffer etc.), or the spatial distribution of observations of elephants with respect to the conservation area boundary, or in which patrol sector most human intrusions are being recorded.

2.9.1 Defining Conservation Area Boundaries
Define the spatial boundaries by uploading ESRI Shapefiles for each of five (5) administrative divisions.

*Note: Shapefiles are required to have an ESRI projection file (*.prj)*

In the menu bar …

Click Conservation Area … Define Area Boundaries
Click the **Load** button beside Conservation Area Boundary to begin the load process.

**Note:** Not all five different zones will apply to all conservation areas.

**Note:** For the initial load of boundaries, there are no features that will be overwritten. On future uses of this feature, the previously loaded boundaries will be replaced with the new selections.

- Click **OK**
- In the **Module 1\Boundaries** folder select **CA.shp**
- Click **Open**

As part of the definition process, the user is required to select an identifier field that will be used for display and querying purposes.

- Under English select “**fid**” from the dropdown list

**Note:** this should be the attribute field with the name of the Conservation Area in the loaded shapefile
• Click **OK**

![Image of Define Conservation Area Boundaries dialog box]

• Repeat the process for the remaining boundary types for this particular Conservation Area
  • **Buffered Management Area = BA.shp**
  • **Area identifier = fid**
  • **Patrol Sectors = PATRL.shp**
  • **Area identifier = fid**
  • Click **Close**

*Note*: If you do not immediately see the map layers in the window then click on the **Zoom to Full Map Extent** icon in the top right-hand corner of the map window

![Image of map layers in SMART software]
2.9.2 Add New Layers
Additional layers for example, roads, rivers, ranger stations, and human settlements can be added to provide context and detail to your map. This will be useful as you start to create analyses and reports of data that will be viewed by the manager. The manager will want to see the proximity of patrol observations in relation to familiar park infrastructure and landmarks/natural features.

- In the top right corner of the map, click on the Add layer icon
- Select Files then Next
- Navigate to Module 2 folder in the support files (either on your USB key or in the files you downloaded from the website)
- Select the file Road.shp
- Click Open

It's possible to add in satellite and topographic baselayers using the SMART basemap utility. Go to the link here and type in the minimum and maximum values for longitude and latitude of the landscape in which your conservation area lies.
27

SMART Basemap Utility

Instructions
This application will automatically create graphical layers which can be used in SMART conservation area basemaps. Enter the geographic extent of your conservation area (in decimal degrees), then press "download" to save the map as a georeferenced image which can be imported by SMART.

File types
Resulting images are saved as georeferenced GIF files.

Choose a map type:
- Satellite
- Topographic

Basemap Longitude Range
- Minimum: 11.03
- Maximum: 12

Basemap Latitude Range
- Minimum: -1.1
- Maximum: -0.04

Preview

- For minimum and maximum longitude range type in 11.15 and 11.95
- For minimum and maximum latitude range type in -1.085 and -0.057

Then choose the map type, either satellite or topographic, then select download. The layer will download as a GIF file. This can then be imported using the process described above for adding new layers.

2.9.3 Changing map projections
The default map datum is WGS84. If you want to change the map datum from something other than the default

- Select Conservation Area > Manage Projections
- From the projections list window Click Add
- In the window at the top type WGS 84 UTM 32S
- Click Save
2.9.3 Adding Basemap details
Map decoration can be added to the maps (including legends, scale bars etc.) to make them easier to interpret. Adding legends, scale bars and north arrows to your maps is simple.

- Click on **add a layer to the map**
- Select **Map Decoration**
- Click **Next**
- Check **Legend, Scalebar and North Arrow**
- Finish

- Deselect all map layers *EXCEPT* Conservation Area Boundary, Buffered Management Area, Patrol Sectors and Roads

*Note: map layers can be found in the ‘Layers’ tab on the left*

- Rename the map layers by right-clicking on the map layer name and selecting **Rename**:
  - Conservation Area Boundary = **SMART National Park**
  - Buffered Management Area = **Park buffer zone**
- Patrol Sectors = Patrol Sectors
- Roads = Main roads

Don’t forget to save your basemap after having added boundaries, additional layers and decorations.

- Now the Basemap has been changed, click again on the save as basemap icon.
- Create a new map called: SMART Map with legend.

Note: it is helpful to move the legend to the top of the list of shapefiles, so it is easily accessible and first.
2.9.4 Save a Basemap
In the SMART Map View you will see the boundary files that are associated with the Conservation Area. In the upper right of the SMART Map View window are the map navigation icons.

- To save your first Basemap click the **save as basemap** Icon

2.9.5 Setting a Saved Basemap
- After a Basemap has been saved, it can be set as the default for the entire session.
From the menu bar select **Conservation Area … Manage Basemaps**
Select **SMART Map with Legend**
Click **Set as Default**
Click **Save**
Click **Close**

Some examples of SMART basemaps are shown below.

3. Managing a SMART database

Once the conservation area is set up field data can be brought in, basic analyses conducted, and reports created. In the sections below we will discuss these processes with special attention given to data entry and analysis as these are core skills required by every SMART user. Also presented is an overview of the SMART reporting function.
3.1 Entering patrol data
Depending on how patrol teams collect field data, there are two ways to bring the data into SMART. The first way first involves importing GPS waypoints and tracklogs with manual entry of observations from field data forms using the data model and associated categories and attributes. The second way involves importing patrol data recorded using the CyberTracker on handheld devices.

In this section, you will work through the process of manually creating patrols in SMART. The goal here is to let you become familiar with creating, editing, and managing patrol data. You will learn the following features:

- Creating a new patrol
- Downloading waypoints
- Downloading or generating tracklogs
- Data entry
- Viewing a patrol map
- Multi-leg patrols
- Exporting and importing patrols
- Patrol filters

3.1.1 Patrol Perspective
The SMART application allows the user to switch between perspectives. In this module, you will explore options within the Patrol Perspective.

Click the Patrol Perspective Icon, highlighted above in red

3.1.2 Manual Patrol Data Entry using GPS and Tracklogs
- You will see that in the Patrol List View there are no patrols currently listed.
- To create a patrol click on the Patrol menu item Create New Patrol

- The Patrol ID will be automatically populated with unique values unless the user enters a new ID manually.
• Click Next

• For the window ‘Patrol Plan’ – leave as ‘None’ selected and pass directly to the next window

• **Note:** this information would typically come from the patrol forms from the rangers in your site.
  • SMART will now reference the previously entered choices for Ground Patrols and populate a pull-down list with those values.
  • Select **Foot** and click **Next**
This screen allows you to specify whether the patrol is armed.

- Select No and click Next

Once again, SMART references the previously entered values for Teams and Stations to populate pull-down lists. Select:

- Team: Mobile Team 1
- Station : HQ
- Next

Select

- Patrol Mandate : Surveillance
- Next

- In the Patrol Objectives form, you can type free form text to describe the objective of the patrol.

  - Type in “Responding to reports of illegal activities.”
  - Click Next
In the Patrol Comments form, you can type free form text to enter any comments related to the patrol.

Type in “Found evidence: people encountered.”

Click Next

The next screen is for entering the start and end date of the patrol.

Enter start date of 9 Sept 2012 and end date of 10 Sep 2012

Next

Each patrol must have at least one employee associated with it. For this patrol, you will select three employees to be associated with the patrol.

Click Add -> OR double click their name

Once the three names appear in the Selected Employees window

Click Next

Note: if you added an employee by accident, click <-Remove
Each patrol must be assigned a leader. SMART will populate the pull-down list with the three previously selected names.

- Select a patrol leader
- Click Next

SMART has the ability to manage multi-leg patrols. These patrols involve portions of the patrol splitting off into a separate group with their own leader and transport type. Later in the exercise, you will create a multi-leg patrol. For this patrol, you will keep the default setting.

- Select No
- Click Finish

SMART will now bring you to the Patrol Summary screen, which shows all of the values that you entered in the previous forms. Any of these can be edited by clicking the edit links next to the item.
3.1.3 Waypoints
Waypoints can be entered into SMART in four distinct ways:

- Direct import from a GPS device;
- Import of a GPX data transfer file;
- Manually entered; or
- Downloading from a csv file- (CSV file import)

- Click **Import Waypoints …**
- Select **GPX File**
Click Next

- **Import All (and assign to correct day)** - SMART will use the time provided in the file and assign the collected waypoints to the correct date
- **Import Only waypoints for <date>** - SMART will import only the waypoints for the selected date
- **Select which waypoints to import for <date>** - The SMART user will select and assign waypoints to the selected date
- Select ‘Import All (and assign to correct day)’
- Click Add
- Browse to the folder Module 3 select **SMART_Mission1_wpt.gpx**
- Click Open
- Click Finish
- On completion of the importing, the following pop-up window will be shown with the results
- Click OK
SMART will read the GPX file and assign the waypoints to the appropriate date.

- **Add Waypoint** - Allows for the manual creation of a waypoint
- **Delete Waypoint(s)** - Deletes a selected waypoint
- **Move Waypoint(s)** - Allows for a waypoint to be moved to a different day

**CSV File Import Option**

If you have a CSV that you want to import, use the below process. A sample CSV is **not** available in the support files.

- Click **Import waypoints**
Select **CSV File** option
Click **Next** and then **Browse** - use this to select the CSV file from which you want to import your waypoints

**Note:** A separate administrator utility is available is being beta tested for importing observation data in CSV. For further details contact info@smartconservationtools.org
CSV File Configuration

- **Note**: additional guidance can be found in Appendix 2
- **X-Column** - select the text from the first row of the file (header or value), which represents the column where the X co-ordinate values are stored
- **Y-Column** - select the text from the first row of the file (header or value), which represents the column where the Y co-ordinate values are stored
- **Date** - select the text from the first row of the file (header or value), which represents the column where the date values are stored
- **Time** - select the text from the first row of the file (header or value), which represents the column where the time values are stored. Valid time formats are as follows:
  1. HH:mm (24-hour time, no seconds given)
  2. HH:mm:ss (24-hour time with seconds)
  3. hh:mm am (12-hour time, no seconds followed by one of: "am", "pm", "AM" or "PM"
  4. hh:mm:ss pm (same as above with seconds)
  5. HH:mm GMT-08:00 (24-hour time, with a GMT + or - timezone)
  6. HH:mm:ss GMT+03:00 (same as above with seconds)

**Waypoint ID** - Select the text that represents the waypoint id you would like to use. Left blank the system will select the next highest number in the patrol-leg-day as the id.

**Comments Field** - Select the text that represents the comments you wish to be added to the waypoint. Left blank, the comments field in SMART will be blank.

**Data Options**

**Coordinate Projection** - Select what projection your X and Y coordinate data is stored in.

**Date Format** - The format your dates from the Date column are stored in. You may type into this field to describe your format if it does not match one of the listed formats.
Skip first row... - Check this box if you have a header row at the top of your data.

3.1.4 Setting Tracks
As part of the patrol, Tracks allow SMART to make calculations based on the length of the patrol and to allow for visualization of the patrol’s route.

Most GPS units collect Track information, and SMART has the ability to import Tracks in the same way as waypoints were imported. SMART can also calculate Tracks based on the available waypoint location and waypoint times.

- Click Set Track … (see below screenshot for location)

- Select Generate from waypoints
- Next
- Select Generate tracks from waypoints for all days
- Finish
- A confirmation pop-up window will be shown when the task has completed, click OK
- The Distance Travelled value will now be populated in the Distance Travelled field
3.1.5 Entering Observations

At this point, you should have configured your Conservation Area with an appropriate observation data model. Now comes the time to transfer the observation data collected in the field into SMART.

- Double-Click the Observation cell for Waypoint 1
- Click the square button (highlighted pink above) on the right to bring up the observation data model
As a short exercise, you are now going to start to enter observations. Observations sometimes come from the data sheets the rangers have provided. For training purposes, in this manual, we will provide you with three examples to test.

Firstly for this first waypoint *(a hunting camp that was burned down by the patrol team)*

- Double-click on **Camp** OR click > in the center to add it to the right-hand window

- **Next**
Enter the observation details as follows:

Threat = **Hunting**

*Note:* you can start typing ‘hunting’ directly in the text box, select ‘Hunting’ from the drop down list, and then click Enter

Status = **Active**

Shelter Capacity = **Small**

Number of Drying Racks = **1**

Action Taken - Camp = **Destroyed**

*Note:* To navigate between the different observation attributes, use the tab key. To select from the drop down list for each attribute, use the left/right arrows and click Enter on the selection.

- Click **Next**
- Click **Yes** when asked if you want to save your changes
- You can now preview the observation data to check it
- If you want to make edits click **Edit in the upper right corner**
- If not, click **Finish**
You can now see the observation of a Shelter or Camp (1) in the patrol window corresponding to Waypoint 1.

Now you are going to fill in the observation data for the remaining waypoints

Note: The default value for all waypoints in SMART is ‘none’, which is equivalent to the ‘Position’ point in MIST.

Waypoint 2 – Direct observation of an adult male elephant

- Double-click in the observation cell for Waypoint 2 to open the data model
- Under Wildlife, double-click on Wildlife – direct observation
- Next
- Threat = ‘None’
- In the Species window, start to type ‘Elephant’
- Select ‘Loxodonta africana (African Elephant)’
- Number of Adult Males = 1
- Action Taken Live Animals = Observed only
- Leave the other attributes blank
- Click Finish
- Click Yes to save.

Waypoint 3 – Two hunters arrested by the patrol

- Double-click in the observation cell to open the data model
- Under Human Activity, double-click on Human Activity – People direct observation
- Next
- Threat = Hunting
- Number of People = 1
- Armed? = Unarmed
- Place of Origin = Village A
- Sex = Female
- Action Taken People = Arrested
- Leave the other attributes blank
- Click Finish
- Click Yes to save.

Note: The section below assumes the user has already learnt techniques for collecting field data using Cybertracker or SMART Mobile. This is covered in a separate training handbook.

3.1.6 Importing CyberTracker Patrols into SMART

Data collected on handheld devices using Cybertracker or SMART Mobile can be imported into SMART. Unlike a standard GPS import, a CyberTracker PDA import will bring in the GPS track and waypoints and all the associated observations with those waypoints.
Plug the CyberTracker PDA back into the computer with SMART installed
From the menu select Field Data - CyberTracker - Import

Import From Device - Used on the first import and will directly import the patrols from the CyberTracker PDA.

Import From File - If the CyberTracker patrols were not assigned in SMART the files are located in the filestore for that particular Conservation Area. By selecting this option SMART will access the filestore allowing users to assign these patrols after the PDA has been disconnected.

Add As New Patrol - Creates new SMART patrols from the selected CyberTracker patrols.

Add As New Leg - Takes the selected CyberTracker patrols and allows users to assign them as individual legs of a multi-leg SMART patrol. Users will be prompted to which patrol this leg will be applied to.

Delete - deletes the selected imported CyberTracker patrols.

Patrol Details - expanding of this window will allow for a detailed view of the CyberTracker.
Select a single patrol then click the icon Import From Device (right-click will bring up same functions)

Select multiple patrols and then assign them as New Patrols

Review the patrols and observations

Full details of how to configure Cybertracker including designing and exporting configured data models are covered in the SMART Advanced Administration Training Handbook.

3.1.7 Importing Patrols from other sources

Now that you have worked through the process of creating a patrol, you will now learn how to import patrols from another source. Patrol exports/imports allows multiple computers to be used to enter in the patrol information while allowing one or more computers to function as the central computer that imports all of the patrols.

From the menu select Patrol - Import Patrol

Click Add

Browse to the folder Module 3\Patrols

Select the two patrols SMART_000002 and SMART_000003.

Note: For this exercise, do not change the given patrol ID number. However, this can be adjusted in the future.
- Click **Open and then Import and then OK**

After a successful import, you should see more patrols in the Patrol Perspective window.
To view all patrols, select the **Patrol Filter icon** (see above icon) and specify ‘**Include All Dates**’ since, by default, only the last 30 days are visible.

Personalized filter settings can be saved by selecting the **Save As Default** option.

### 3.1.8 Patrol Perspective - Map

The initial map perspective is only one area where the mapping layers can be accessed. There are mapping windows in the Patrol and Query Perspectives, which should all appear the same now that you have set a Basemap for the session.

- In the Patrol List View double-click the patrol **SMART_000002** (you may have to change the patrol filter to look for patrols from all dates)

- At the bottom of the screen select the **Map** tab

---

**Note:** In the bottom left-hand Layers window, you may have to move the waypoints and track to the top of the legend to view it properly.
- Using the Zoom icon on the right side of the map draw a box around the circle of waypoints for the patrol

In the lower left Layers window you will see the legend for the boundary layers as well as two new layers (Waypoint and Track)

As with the boundary layers the Waypoint and Track layer can be styled and labelled.
- Select the layer **Waypoint**
- Click the **Style Editor** icon
- On the left select **Points**
- From the dropdown (above Style Properties) select **circle**
- In the General tab of Style Properties set **size** to **11**
- In the Fill tab set color to **black**
- In the Labels tab
  - Enable labelling
  - Set Field based labels to **observation**
- Click **Apply**, then **OK**
3.1.9 Information Tool

The map windows for the patrol and query perspective contain an extra icon that is not available in the map perspective mapping window.

- Click the Map Info tool to activate it.
- Click on a **waypoint**
- Select the waypoint in the **Information tab** on the left
- Click on the **Waypoint Information** tab for observation details

**Note:** At any time during a session, the SMART windows can be resized, undocked, and repositioned. If you wish to reset the SMART application back to its default window, placement you will need to click the double green arrows just below the main menu.

- Click the **window reset icon** to return to the default settings
- Click **Yes**

You should still be zoomed into the points and track for the patrol SMART_000002.

- To return to the full extent click the **zoom to map extents** icon

Previous sections went step by step through the procedures for setting up the database and adding patrol data to it. In the next section we will start to explore how patrol data can be analysed using the SMART tool.
3.2 Conducting question-driven basic analyses

At the core of the SMART software is a powerful tool for conducting basic analysis of data. In this section you will learn about the Queries Perspective in SMART. This feature in SMART lets the user perform a wide variety of question-driven analyses. The types of questions that SMART can answer range from simple to complex. For example, one can ask where were elephants observed by any team anywhere, anytime, or where were elephants observed by ranger team A in the core zone during a specific time period. When designing queries and summaries it is important to include the site manager in the discussion as he/she will be the person most likely to be using information from SMART analyses for decision-making.

In this section, we will look at the following functionality:

- Creating simple observation queries
- Creating simple patrol queries
- Understanding and using the query wizard
- Creating compound queries using patrol filters
- Creating queries using data model filters
- Creating queries using spatial filters
- Understanding & changing query properties
- Saving & deleting queries
- Exporting & importing queries
- Creating simple summaries
- Creating complex summaries
- Creating gridded queries

In this section you will start exploring some very powerful functions that allow for simple or complex queries and summaries to be developed and exported. Queries and summaries are tools used to extract patrol and observation information from the database. They each produce their own type of results and have different workflows to produce those results.

3.2.1 Definitions

**Query**

A query displays raw records that are selected using filters. No summarizing (totals, etc.) is done. This allows users to view the raw patrol and observation data. Queries can be viewed in tables or on a map.

*Example: Show me all waypoints where human activity was observed*

![Query example](image)

**Data Query**

All data queries or patrols queries can be defined in SMART. These queries are based on all observational data sources in the database. Queries based on patrol data can also be created that provide attributes in addition to data model items as filters.
**Patrol Query** - Returns the patrols that were involved in the particular query. No observation information is retrieved from the database.

- **Patrol Observation Query** - Returns all the patrol attributes as well as all the data model categories and attribute information associated with the observation.
- **Patrol Incident Query** - Returns all the patrol attributes associated with the incident as well as the incident location and time details
- **Observation Query** - Returns the observations that were involved in the particular query.
- **Incident Query** - Incident filters will return all observations at any incident that matches the filter.
- **Gridded Query (All Data Gridded Query or Patrol Gridded Query)** - Spatial query that returns the observation or patrol effort values in the form of a grid.

**Summary**

A summary provides an overview of the raw data and allows for grouping into different categories. Items that can be summarized are values such as total number of patrols, the total distance travelled, the total number of snare observations, etc. Groupings are categories such as management sectors, patrol types, patrol mandates, stations, teams, etc. Summaries can only be viewed as tables.

*Example: Show me the total number of snares observed in each management sector for each month in 2012*

![Table Example](image)

3.2.2 Query and Summary Components

SMART queries and summaries are a logical expressions used to filter the entries in the database.

SMART filters include:

- Date
- Patrol
- Data Model
- Area

Operators are used to alter the logic of the query to allow SMART users to be able to build more complex queries. Operators include:

- AND
- OR
- NOT
- Brackets: ()
- Contains
- Not Contains
- Equals: =
- Less Than: <
- Greater Than: >
- Less Than or Equal to: <=
- Greater Than or Equal to: >=
- Less Than or Greater Than (Not Equal to): <>

- Click on the **Query Perspective** icon
Once a new query has been created the below window will appear.

**Query and summary results:**
- Tabular and mapped

**Saved queries and summaries**

**Data Filters**

**Query and summary definition**
### 3.2.3 All data observation query

#### Creating a Simple Observation Query for All Data

For this example, you will build a simple query to extract which observations were made by a specific team. In the exercise you will use the ‘New Query Wizard’ which will help guide the user on which query should be used to extract the information that is required.

- Click on the **Create a new query** icon to open the New Query Wizard

<table>
<thead>
<tr>
<th>Filter</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Date: <strong>Waypoint Date</strong></td>
<td>Filters the date of the query</td>
</tr>
<tr>
<td><strong>Query: &lt;No Name Query&gt;</strong></td>
<td>Used to change the name of the query</td>
</tr>
<tr>
<td><strong>query properties...</strong></td>
<td>Changes the name of the query. Filters the fields returned in the query results</td>
</tr>
<tr>
<td><strong>Tabular Results</strong></td>
<td>Switches between tabular results and mapping results</td>
</tr>
<tr>
<td><strong>Saved Queries/Summaries</strong></td>
<td>Folders of saved queries</td>
</tr>
<tr>
<td><strong>Patrol Filters</strong></td>
<td>Used to filter the results based on patrol information</td>
</tr>
<tr>
<td><strong>Data Model Filters</strong></td>
<td>Used to filter the results based on categories and attributes in the data model</td>
</tr>
<tr>
<td><strong>Area Filters</strong></td>
<td>Used to filter the results based on the spatial boundaries of the Conservation Area</td>
</tr>
<tr>
<td><strong>Operators</strong></td>
<td>Operators of NOT and Brackets () used to change the logic of the query</td>
</tr>
<tr>
<td><strong>Run Query...</strong></td>
<td>Launches the query</td>
</tr>
<tr>
<td></td>
<td>Clears the query</td>
</tr>
<tr>
<td></td>
<td>Saves the query</td>
</tr>
</tbody>
</table>
• Select All Data Queries and click Next

You can now select the type of query you wish to perform. When you click on a query type a description of that query appears.

• Select Observation Query
• Click Finish

• In the main query window change the date setting to All Dates

Note: The default for the query dates are for the last 30 days. For these exercises, you should change the setting to All Dates unless instructed otherwise.
To start to build a query about all observations of weapons, double-click on **Weapons and Gear Seized** under Data Model Filters on the right-hand bar, it will then appear under SMART Query Definition in the lower window.

- Make sure that **Observation Filter** is selected under filter type.

- To the right of the lower window, click on the green arrow to **Run Current Query**.
You can see query results as either a TABLE or MAP

- To switch between Tabular and Mapped results, click on the two tabs shown

**Note:** The process of customizing the map’s appearance and settings are the same in the Mapped Results windows as in other windows.
Saving a Query

Click on the icon ‘Save As’

- Enter **Weapons and gear seized** as the Query Name
- Select **My Queries**
- Save
Query properties

*Click on query properties.....(Note: You need to be on the tab: Tabular results)*
You can select/de-select the fields you want to display in the query table
When you’re finished click OK

Save any changes
You will now see ‘Weapons and gear seized’ under My Queries in the Saved Queries/Summaries tab.

3.2.4 All data incident query
Incident vs. Observation
An observation is a single item observed and consists of exactly one category from the data model and all its associated attributes. An incident is a collection of observations that occur at the same point and same time (a Waypoint).
You will now run an incident query for ‘Weapons and gear seized’ to compare.
Note: you can also tell the difference between what types of query you are running by the icons see below.

- Select **Query - All Data Queries - New Incident Query**
- Select **All Dates** in the drop down
- In the data model double click on ‘**Weapons and Gear Seized**’
- Run the query using the green arrow
In the results window, the number of incidences is shown. In this example there are fewer incidences than observations as multiple observations of weapons and gear seized were found at one waypoint.

3.2.5 Patrol Query
Now we will run a basic Patrol Query, which displays the patrols that match the given query filters. The process of building a Patrol Query is the same as the Observation Query but the results will also return information on patrols and which patrols were associated with an observation.

For this exercise, you will build a query to see which patrols encountered poachers.

- Select Query – New Query – Patrol Queries- New Patrol Query ...
- Select All Dates
- Save query as Poacher encounters under My Queries
Using the query filters, under the category of **People – direct observations**

- Double-click on **Threat**
- Next click on the dropdown, a window will appear where you can start to type **Hunting**. When Hunting appears, double click on it.

- Run the Query

In the Query Properties for a Patrol Query, you will see that the available fields are fields relating to patrols and not of the observations.
In the Mapped Results view, the Tracks of the various patrols are returned and mapped. No waypoint information is returned.

**Note:** The color and thickness of the track line can be edited using the same tools as the other layers (by selecting the Layers tab on the right-hand side) in the Mapped Results.

3.2.6 Patrol Observation and Incident Queries

In the previous example, you ran a patrol query which extracted only information about patrols and not observations. Next, we will run a patrol query which will extract observational data as well.

- Select **Patrol Queries - New Patrol Observation Query**
In the Query Properties for this query, you will see that the available fields are fields relating to patrols and of the observations. You can also try running the same query but as a Patrol Incident Query.

Conservation Area Queries and My Queries

The two base areas to save queries are Conservation Area Queries and My Queries.

- **Conservation Area Queries** - Accessible by all user accounts except for Data Entry, but only Admin and Manager user levels can save and make edits.
- **My Queries** - Accessible only by the user account that created them. All accounts except for Data Entry can save and make edits.

*Note: Queries and Summaries saved under My Queries will only be accessible to Reports saved under My Reports. Queries and Summaries saved under Conservation Area Queries will only be accessible to anyone generating a report. (Note: Reports will be covered in Module 5).*

Creating Compound Queries using Patrol Filters

In the previous example, you extracted all patrols where humans who were hunting were encountered. For the next example, you will create a compound query to further filter the results by finding patrols, which encountered humans that were done on foot.

- Double-click on Poachers encounters to open that query
- Double-click **Transport Type** under **Patrol Filters** in the Query Filter window on the right to add it to the query.
- In the **Transport Type** drop-down list, select **Foot**
- Select **All Dates**
- Run the Query
• Save a copy of the Query as **Poaching encounters on foot**
• Save under **My Queries**

**Using Attributes in a Compound Query**

If you want to keep building on the query, you can continue to add additional categories or attributes to the query.

• Open the **Poaching encounters on foot** query
• Under Data Model Filters, go to **Attributes**
• Scroll down to find **People Armed**
• Double click on it to add the attribute to the query definition
• Select **Armed** under the dropdown
Run the query and save it as a new query under My Queries with a new name

Using Query Properties

The next query will return all direct observations of elephants and the associated patrol information

- Select **Query – New Query – Patrol Queries - New Patrol Observation Query ...**

  - **Select All Dates**
  - In the Data model filters, go to **Categories** and double-click on: **Wildlife – Direct Observation** and **Species**
  - Enter ‘**elephant**’ in the text filter window on **Species** and select **Loxodonta africana**
- Run the Query
- Rename the query **Elephant-direct observations** and save the query under my queries
- In the query properties, De-select all and then select only
  - Patrol ID
  - Mandate
  - Observation Category 0
  - Observation Category 1
  - Species
- OK
- Sort data by Patrol ID by clicking on the column header
Creating a Query Using Attributes

Patrol Queries based on attributes will return results across all categories in the entire data model for any observation where that attribute value was used.

For this example, you will create a simple Data Model Attribute query to extract all observations where elephants were recorded (not just direct observations).

- Create a **New Observation Query**
- Save as **Elephant - All observations** under **My Queries**
- Under Data Model – Attributes, find and double-click on **Species**
- Enter ‘**Elephant**’ in the text filter and select “**Loxodonta**”

- **Select All Dates**
- **Run Query**
- Review the results
- **Compound Queries Using Operators**
Using Operators allows for more complex queries to be built. The logic for Operators is the same in SMART as it would be when building a mathematical equation.

This query will return **only observations of hunting**

This query will return **both observations of hunting and observations of logging and wood harvesting**

This query will return observations of hunting or logging but only if they were made by Anti-poaching patrols

**Note:** Once components in the Smart Query Window have been included, they can be repositioned by dragging and dropping or removed by clicking the “x” in the upper right of the feature.

**Invalid Query**

SMART will only allow valid queries to be run. If a query is incomplete or invalid, the green Run Current Query icon will be unavailable and there will be a Query error warning at the bottom of the screen.

**Creating Queries using Area Filters**

Area filters allow for results to be filtered using the administrative boundaries associated with the Conservation Area.

For this example, you will build a patrol observation query to extract all hunting observations in Patrol Sector 2.

- Create a **New Patrol Observation Query**
- Double click on **Threat** in the list of attributes
- Enter ‘hunting’ in the filter text window
- Select **Hunting** and click **Enter**

- Select **All dates**
- Run Query and view **Mapped Results**
- Now add the **Patrol Sector 2** to the Query by double clicking on **Patrol Sector 2**
Run the Query and view the results again under **Mapped Results**

Save the Query under My Queries as **Hunting observations - Patrol Sector 2**

*Note*: *Only the observation in Patrol Sector 2 are returned*

### 3.2.7 Exporting Query Results

**Exporting results as a Shapefile** — *Available only for queries and not summaries*

A query export of the file type Shapefile will produce a Shapefile of the results that are viewable in the Mapped Results tab. This Shapefile can be used for creating new maps or to distribute to others or to import into ArcGIS.

- Open the **Poaching Encounters** query, run the query with All Dates selected
- Click on the Export Icon and select **Shapefile (*.shp)**
- Click on Next and save the shapefile in the Module 4 folder

### 3.2.8 Summary queries

Summary queries are built by placing Value Options and Group By Options into the Smart Query Definition windows. The Group By Options are used to provide an aggregation of the Value Options.
The simplest of Summary Queries can be a single Value Option with no Group By Options, and there is no end to how complex a summary can be. However, some combinations of Values and Group Bys are not permissible and SMART will not allow the summary to be run until the error is resolved.

**Simple Patrol Summary Queries**

For this example, you will build a simple summary to calculate the total number of patrols entered into the system for this Conservation Area.

- Select **Query** – **New Query** – **Patrol Queries** - **New Patrol Summary Query**
- Select **All Dates**
- Under Patrol Values, double-click **Number of Patrols** to add it to the Summary Values window

- Run the Summary by using the green arrow

The SMART summary will display the total number of patrols for this Conservation Area

- Return to the Value Options and add **Distance (km)** to the query
- Add **Distance (km)** a second time to the query window

Building on the complexity of the summary, you will add the **computed value of Number of Patrols per Kilometer travelled**.

- On the lower Distance (km) click **Compute Rate …**
- Select **Number of Patrols** from the pull down list
- Click **OK**
- Run query
- Save the Query as **Number of patrols per Km travelled**
**Query Name:** Number of patrols per km traveled

<table>
<thead>
<tr>
<th>Number of Patrols</th>
<th>Distance (km)</th>
<th>Distance (km) per</th>
</tr>
</thead>
<tbody>
<tr>
<td>3.0</td>
<td>164.50526428</td>
<td>54.835088094</td>
</tr>
</tbody>
</table>

**Patrol Summary Query**

ID: 000007

summary properties...
Simple Data Model Summaries

As with the queries, there are options to build up summaries of Patrol Values, Data Model Values or a combination of the two.

This example is a simple data model summary that counts the total number of observations that are under the category of Hunting.

- Create a new Patrol Summary Query (Query - New Query - Patrol Queries - New Patrol Summary Query)
- Select Group By Options - Data Model Group Bys – Categories & Attributes – Human Activity – Threat- Biological Resource Use – Hunting (Double click on Hunting to add it to the query definition window)

- Then select Value Options – Data Model Values- Count ‘All Categories’ – Count ‘Human Activity’ and double-click to add it to the query
- Select ‘Count Incidents’ (this will count the number of unique waypoints, rather than the number of observations)

- Select All Dates
- Run Query
- Select the Filters option next to Human Activity
- Add other threats to hunting in the query window by selecting other threat categories in the filter window (NTFP collection and Logging and Wood Harvesting)

- Re-run the query
Now we will add a column header to the query to expand the summary.

- Double-click **Mandate** in the **Group By Options – Patrol Group by**
- Drag Mandate under ‘Column Headers’ (By default ‘Mandate will be added to the ‘Row Header’ window. To move it, simply select it and drag it under the ‘Column Header’ window)
- Re-run the query

**Grouping by Date**

You can also group-by date – this allows you to report observations by Start or End Hour, Day, Month or Year
- Select **Group By Options** – Patrol Group Bys - Date – Month
- Double-click to add to the query

- Re-run query

**Query Name: Human Activity Incidents**

Filters provide a simple way to filter summary results

- Click on **Filters** next to Mandate
Deselect all except Anti-poaching
Re-run the query

Saving Summaries
Summaries are saved in the same way as queries. Save the summary query you just created as ‘Number of threats by anti-poaching patrol’ under My Queries.

3.2.9 Exporting Summary Query Results
Comma Separated Values (CSV) table
A query export of the file type Comma Separated Values (CSV file) imported into other spreadsheet or database software (e.g. Excel), to recreate the results that are seen in the Tabular Results view.

- After you have run the summary query, click on the Query Export icon and select Comma Separated Values (*.csv).
- Save the file on your computer
- Locate the file and open with Excel to see the results.

3.2.10 Exporting and Importing Query Templates
Once a query or summary is created, it can be exported out to an XML file that can be used by another Conservation Area. Importing pre-existing queries and summaries allows for standardization of analysis and reporting where data models shared common fields (this is covered in the next module).

Query Definition
A query export of the file type Query Definition will produce an XML text file that can be distributed to others, allowing them to import the query into their Conservation Area.

Using the menu or the export query icon you can export queries and summaries.
3.2.11 Gridded Query

Gridded Queries can be created for both All Data Queries and Patrol Queries. We will now create a Patrol Grid Query.

- In the menu select **New Patrol Grid Query**
- From the Data Model Values double-click **Count Human Activity** to add to query
- Select **Count Observations**
- Ensure **Projection** = **WGS 84/UTM 32S**
- Change **grid size to 1000m**
- Select **All Dates** in the date filter
- Run query

**Tabular Results**

The default view is for the list of tabular results. This table shows the grid co-ordinates and values of how many observations were found within that grid cell. The output includes all grid cells patrolled during that period, so if a grid cell was patrolled and found no observations it will have a value of 0. The table also includes the denominator value (e.g. distance patrolled) if there is one selected (see encounter rates below). For most users, the Tabular Results will not be as important as the Mapped Results.

**Mapped Results**

As with other types of queries, the results can be viewed in tables or in a map. The results for this type of query are displayed as a raster or grid layer.
The Mapped Results screen now shows a number of grid cells of varying color where grid cells were patrolled and where observations from the query can be found. The color of each grid cell corresponds to the number of observations recorded within the cell.

Change the Map Style of Gridded Queries

In the previous modules, you explored different options for changing the style of points, lines and polygon layers. Now, you are going to modify the style for a gridded query result layer.
Click on the Layers tab (next to the Query Filter on the window on the right).
Select the layer No Name Gridded Summary (null)
Click on the icon to change the style of the layer
Select Single Band Raster (on the left-hand menu-bar)

**Note:** Don’t modify the first line (0-9999 – no data).

Click Add twice to add 2 more intervals
Change the values for the intervals at four equal intervals between the minimum and maximum value (for example if the minimum is 0 and the maximum is 9, change interval values to 0, 3, 6, 9).
Under Color Palette, select the color ramp that you like
Click Apply
Click OK
Add a legend

- Next to the map, click on the icon **add a layer to the map**
- Select ‘**Map decoration**’
- Click **Next**
- Check ‘**Legend**’
- Click **Finish**
- Load the Basemap ‘**SMART Map with Legend**’ that you created in Module 2 by clicking on the map icon

- In order to rename the query and how it appears in the legend, right-click on the query layer and selecting ‘**Rename**’
Save the query as ‘Human Activity Observations’ under My Queries

**Encounter Rate Grids**

You can also directly calculate encounter rates (e.g. number of observations/unit effort) in each grid cell.

- Click **Compute Rate** next to **Count Observations – Human Activity**

- Select **Distance (km)** and click **OK**

The query will now calculate the number of human observations/km patrolled.

- Run the query
- Save the query as **Encounter rate of human activities** under My Queries

**Filtering a Query**

A filter can be applied to the gridded summary. For grids, there are two types of filter:

- **Value Filter**: Filters the numerator/observations (i.e. number of human activity observations)
- Rate Filter: Filters the denominator/unit of effort

As an example- set up the gridded summary to calculate the **encounter rate of hunting observations** (i.e. only human activity observations filtered by hunting) **by km patrolled** (for all patrols, not just those where hunting was observed)

Click on the Filters tab

- In the Data Model Filters list double-click on **Human Activity – Threat** to add this under the Value Filter
- Type ‘hunting’
- Select Incident Filter
- Leave Rate filter blank (you want to include all patrols without any patrol)
- Run the Query

- Save as ‘**Hunting observations/km**’ under My Queries
Patrol effort grids

Grids can also be created for different measures of patrol effort (distance patrolled in each grid cells, number of patrol days in each grid cell).

- Create a **New Patrol Grid Query**
- Set Projection to **UTM 32S** and grid size to **1000m**
- From Patrol Values, select **Distance**

The tabular results show the distance patrolled in each grid cell

The mapped results shows patrolled coverage as a function of patrol distance patrolled in each grid cell

- Save the query as **Patrol Coverage by Distance** under **My Queries**

### 3.2.12 Importing Queries and Summaries

Queries and Summaries are imported into SMART using a previously exported query saved as an XML file. To demonstrate this, you will import a few queries and summaries into a custom folder in the Conservation Area Queries.
From the menu select **Import Query ...**
Select **Import from File** and click **Next**
Click **Add** and browse to folder **Module 4\Queries**
Select **Elephant carcasses - observations.xml**
Click **Open**
Click **Next**

- Select **Conservation Area Queries**
- Finish

Under **Conservation Area Queries**- you'll now see the new query (you might need to expand the arrow under Conservation Area Queries)

- Double-click on the query to see how it was created under the SMART query definition window
- Run the query (make sure **All Dates** is selected)

In the Query folder there are a number of queries and summaries you can import into SMART

- Import the rest of the queries under **Conservation Area Queries**, and run each to see the results.

*Note:* You can import all queries and summaries in the Query folder at once by selecting all and importing.
Note: You will need some of these queries to create the Reports in the next module

Case Study: Monitoring patrol effort and trends in hunting in African forests

At community-managed forests in Nigeria and Kenya, gridded queries and patrol queries are helping managers to interpret trends in patrol effort and to target hotspots for wildlife crime. The effectiveness of patrol efforts is monitored by mapping the coverage of all patrols completed each month as well as monitoring key factors such as distance walked and the number of patrol days completed.

Patrol spatial coverage at Mbe community forest in 2009 (L) and 2015 (R) showing increasing trend.

Also monitored are indices of human threats such as the frequency of wire snares, hunting camps, and empty shotgun shells discarded by hunters. Data outputs are created as patrol summary queries. Collectively the encounter rate of hunting signs showed a broadly decreasing trend from 2009 to 2016.
3.3 Overview of reports

Once queries and summaries are set for the Conservation Area, it is possible to create reports to summarize these basic analyses in standard format. Reports can be designed for different purposes, for example a monthly or quarterly summary of law enforcement efforts by patrol teams, to summarize information acquired on distribution and threats for a focal species of interest, or to compare results from patrolling across a network of protected areas.

This section is intended as an overview of how the SMART report function works:

- Viewing reports
- Exporting reports
- Importing reports

For details about designing and running reports using the SMART reporting tool, please see the separate SMART Advanced Reporting Training Handbook.

3.3.1 Viewing and running reports

We will use the Example Conservation Area to demonstrate the functionality of reports. Login using ‘smart’ and ‘smart’. To view reports that have already been created, select the down arrow next to the report button and View Reports.

Report List Toolbar

The report toolbar has icons for creating, editing, running, exporting and deleting reports.

<table>
<thead>
<tr>
<th>Icon</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Deletes the selected report(s)</td>
</tr>
<tr>
<td><img src="create.png" alt="Create" /></td>
<td>Creates a new report</td>
</tr>
<tr>
<td><img src="edit.png" alt="Edit" /></td>
<td>Edits the selected report(s)</td>
</tr>
</tbody>
</table>
3.3.2 Exporting Reports

Reports can be exported in a variety of formats (e.g. PDF, Word document etc.), which then can be used for easy distribution or importing into other applications. In addition to being able to export/import patrols, queries and summaries, SMART can export report definitions that can be imported into another installation of SMART. This feature allows for a template to be built and then distributed to other databases or offices to reduce the effort in creating new reports and to ensure standardization.

3.3.3 Report Definition

A Report Definition zipfile is a complete package that allows for other installations of SMART to import the report and its dependencies. A report can contain images, queries and other report objects and the report definition file bundles these together to make for easy importing into another system.

In this sample report, notice that the three components, patrol effort by ranger, patrols with arrests and patrol coverage, each correspond to queries or summaries that were saved in the database. The results have simply been imported into the report template, and formats applied to present them in tabular or map format.

<table>
<thead>
<tr>
<th>Ranger</th>
<th>Number of Patrols</th>
<th>Number of Days</th>
<th>Number of Nights</th>
<th>Number of Hours</th>
<th>Distance (km)</th>
</tr>
</thead>
<tbody>
<tr>
<td>David Aliata</td>
<td>3</td>
<td>6</td>
<td>3</td>
<td>93.21</td>
<td>40.139</td>
</tr>
<tr>
<td>John Peter</td>
<td>5</td>
<td>12</td>
<td>7</td>
<td>124.45</td>
<td>204.644</td>
</tr>
<tr>
<td>Lillian Wendy</td>
<td>2</td>
<td>4</td>
<td>2</td>
<td>45.21</td>
<td>13.224</td>
</tr>
<tr>
<td>Samnang Tang</td>
<td>2</td>
<td>3</td>
<td>1</td>
<td>72.00</td>
<td>26.915</td>
</tr>
<tr>
<td>smart smart</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tim Obiek</td>
<td>3</td>
<td>7</td>
<td>4</td>
<td>55.23</td>
<td>164.505</td>
</tr>
<tr>
<td>Tony Wambu</td>
<td>3</td>
<td>7</td>
<td>4</td>
<td>55.23</td>
<td>164.505</td>
</tr>
</tbody>
</table>

Patrol Efficiency Summary

Example Conservation Area (SMART)

2012-03-17 to 2018-01-03

Patrol Effort By Ranger

<table>
<thead>
<tr>
<th>Patrol ID</th>
<th>Type</th>
<th>Patrol Start Date</th>
<th>Patrol End Date</th>
<th>Objective</th>
<th>Mandate</th>
<th>Patrol Transport Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>SMART_000001</td>
<td>Ground</td>
<td>Sep 9, 2012</td>
<td>Sep 10, 2012</td>
<td>Responding to reports of illegal activities</td>
<td>Surveillance</td>
<td>Foot</td>
</tr>
</tbody>
</table>

Patrol Coverage
• In the Report List right-click the mouse to bring up the **Export Report** option

• Select **Report Definition (.zip)**

• Browse to **Module 5** or other folder on your computer

• Save the **Patrol_Effort_Summary.zip**
3.3.4 Importing Reports

After the report has finished exporting, you will import the report definition back into your installation of SMART and rename the report. Imported reports will also import any queries, summaries and other report objects if they do not currently exist.

- Under the Report menu, select Import Report
- Select Import from File and press Next
- Click Add and browse to Module 5
- Select Patrol_Effort_Summary.zip that you just exported
- Click Next

Select Conservation Area Reports as the folder
Click Finish

Note: SMART will warn you that a report of the same name already exists.

- Click Create New
- OK
You’ll now see two reports in the Report List. You can change the name of the second report by right-clicking and selecting ‘Rename’. You can then modify as you wish.

Practice exercise using reports

1. Login to the New Conservation Area
   - Under the Report menu, select **Import Report**
   - Select **Import from File** and press **Next**
   - Click **Add** and browse to **Module 5**
   - Select **Effort_summary_000001.zip**
   - Click **Next**
   - Run the report and see the results
   - Now go to back to the Report menu
   - Select **MIKE_report_000002.zip** run the report and see the results

2. Take a look at sample reports from real SMART implementation sites in Annex 1. Consider the elements of the reports that might be incorporated in reports for the site where you are working.

4. Using SMART for adaptive management; tasks for the data manager

Recent research\(^1\) has shown that less than a quarter of protected areas around the world are effectively managed. As mentioned in section 1, SMART is designed to help improve the protection of important conservation areas through streamlining the conversion of field data collected by rangers into information on the human activities and threats to wildlife that can be used for strategic planning. For this process to work, the SMART database should receive regular updates and be managed effectively. The data manager plays an important role in making sure that data and information flows happen. The key tasks are described below;

4.1 Ensuring data comes in on time
Patrol data should be entered as soon as possible after patrols are completed so as to ensure that events requiring action such as poaching, encroachment, harvest of wildlife or other resources or other illegal activities are quickly brought to the attention of the manager.

- At sites that have implemented SMART Connect, field teams can potentially upload patrol data in real-time across cellular networks using handheld devices, with data made available to managers via dashboards. For example, the Philippines Department of Natural Resources and Environment (DENR) has centralized the collection of forest threats data across 220 community and provincial offices such that daily updates on patrol effort are possible;

---
• Where connectivity is limited or absent, a system should be set in place to ensure regular transfer of data from the field to the data manager. For example, waypoints, tracklogs and field forms may be submitted to the data manager within a set timeframe. For example in Bangladesh the Forest Department has adopted a one-month cycle for patrol data flows as shown in Annex 2.

4.2 Ensuring basic analysis done on time
A set of standard queries and summaries should be developed for the conservation area through consultation with the site manager, senior rangers and conservation advisors. The queries and summaries should collectively answer all of the important questions about patrol efforts and results that the management needs to know. Analysis needs to be conducted at relevant time intervals;

• Daily/Weekly analysis – the manager may be interested in tracking the efforts of individual stations, teams, patrol leaders or members (e.g. distance per patrol, illegal activities detected) that are operating in hotspot areas or that may require close supervision, or following movements of tracked entities (e.g. marked individual animals, vehicles or persons of interest). This may require more frequent running of some queries and summaries;

• Monthly analysis – the manager would usually require a regular update on the overall efforts and results of all teams in the conservation area;

• Quarterly/Annual analysis – monthly trends in patrol efforts and threats may be monitored over longer periods.

4.3 Ensuring reports produced on time
Reporting needs will usually be dictated by the national agency or organization operating the network of conservation areas (e.g. National Park, Wildlife, Forestry, Marine Department, Community Conservancy etc). Sometimes donors supporting conservation implementation may have specific requirements for information that influence the types of reports or reporting frequency. For example, in Wildlife Sanctuaries managed by the Cambodia Ministry of Environment, site managers must report at the beginning of each month. To achieve this, SMART data is collated by the 20th of each month, analyses are completed by the end of the month with monthly reports created by the 5th of each month.

Further considerations for adaptive management under the SMART approach are discussed in the SMART Adaptive Management Training Handbook.
Annex 1: Sample pages-SMART monthly report, Keo Seima Wildlife Sanctuary, Cambodia

---

**Keo Seima Wildlife Sanctuary (KSWS)**

**Law Enforcement Report for January 2017**

2017-01-06 to 2017-02-01

---

### 1. Rangers Information

<table>
<thead>
<tr>
<th>Nº</th>
<th>Target</th>
<th>Amount</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Number of Patrol Day</td>
<td>20</td>
</tr>
<tr>
<td>2</td>
<td>Number of Patrol Night</td>
<td>5</td>
</tr>
<tr>
<td>3</td>
<td>Distance by Foot Patrol (Km)</td>
<td>25</td>
</tr>
</tbody>
</table>

---

**Map: Spatial Target Plan**

---

**Station**

- Dorm chomlok
- Keo Seima
- O-Rang
- Rabbot
- Roka Thnhey
- Sre PIeng
- Stations
- Roads in Seima
- Conservation Area
**Patrol Effort by Stations**

![Bar chart showing patrol effort by stations with categories: Number of Patrol, Number of Day, and Number of Night. The stations are Dem Chambok, Keo Seima, O Rang, Rahost, Roka Thmei, and Sre Pleg.]

**02. Stations Effort by Transportation Type**

<table>
<thead>
<tr>
<th>Stations</th>
<th>Foot Distance (km)</th>
<th>Motorbike Distance (km)</th>
<th>Car Distance (km)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sre Pleg</td>
<td>22.68</td>
<td>627.14</td>
<td>0</td>
</tr>
<tr>
<td>Dem Chambok</td>
<td>0</td>
<td>567.18</td>
<td>0</td>
</tr>
<tr>
<td>O Rang</td>
<td>21.20</td>
<td>569.10</td>
<td>0</td>
</tr>
<tr>
<td>Rahost</td>
<td>6.81</td>
<td>781.22</td>
<td>0</td>
</tr>
<tr>
<td>Keo Seima</td>
<td>2.50</td>
<td>146.63</td>
<td>2067.92</td>
</tr>
<tr>
<td>Roka Thmei</td>
<td>0</td>
<td>763.87</td>
<td>0</td>
</tr>
</tbody>
</table>

**Station Effort by Transportation Type**

![Bar chart showing station effort by transportation type with categories: Foot, Motorbike, and Car. The stations are Dem Chambok, Keo Seima, O Rang, Rahost, Roka Thmei, and Sre Pleg.]

Prepared by GIS Team
Annex 2: Flow chart of SMART data collection, reporting & management in Bangladesh Sundarbans Reserve Forest

* Day(s) means working day(s) or holiday(s).