

SEAN sea otter monitoring SOP 19: Detection count data from images (deliverable SO_I)

Revision History Log:

Previous SOP version	Effective Date	Revised By	Changes Made	New SOP version
-	September 2018	Jamie Womble	Initial version	1.0

Summary

After completion of field work for a survey effort and acceptance of the SO_C georeferenced photo deliverable, selected photo pairs are “read” for count of sea otters, times, locations, and covariates using a variation on the processes in SOP 8. Photo pairs are chosen using the accepted SO_D data to identify consecutive photos containing sea otters and the ACDSee application to determine whether the otters are in the overlap zone between pair members. This results in a CSV data file for each aerial survey which, along with others, are zipped into a package. The resulting SO_I is submitted to formal quality control. Once validation is passed and the deliverable is accepted, it is disseminated through repositories. The final product is then used as a basis for calculating the detection probability to inform the population estimation process (see SOP 9).

Detailed Steps

1. Project Leader tasks
 1. Verify the SO_C and SO_D deliverables have been formally accepted for dissemination.
 2. Prepare the network file work area.
 1. If not present, create the folder [\\sean.glba.nps.gov\Data\SEAN_Data\Work_Zone\SO\SO_I\yyyy](\\sean.glba.nps.gov\Data\SEAN_Data\Work_Zone\SO\SO_I\yyyy) where yyyy is the survey year. If the folder already exists, delete any contents. This will hold the final SO_I.
 2. Delete the contents of [\\sean.glba.nps.gov\Data\SEAN_Data\Work_Zone\SO\SO_D\yyyy](\\sean.glba.nps.gov\Data\SEAN_Data\Work_Zone\SO\SO_D\yyyy) where yyyy is the survey year. This will hold the accepted SO_D.
 3. Download the year’s accepted SO_D product from Data Store to [\\sean.glba.nps.gov\Data\SEAN_Data\Work_Zone\SO\SO_D\yyyy](\\sean.glba.nps.gov\Data\SEAN_Data\Work_Zone\SO\SO_D\yyyy).
 4. Unzip the SO_D file into the same folder.
 1. There should be one CSV file for each aerial survey.
 2. By being sure to use the Data Store accepted version instead of old contents of questionable provenance, reproducibility is maintained.
 3. Start up the CountThings application with the default template. Detailed operation of CountThings is explained in SOP 8,
 1. On the Settings “CSV | Export” screen be sure all fields are checked on including DETECTION_GROUP and DETECTION_REPETITION (Figure SOP19.1).

Figure SOP19.1. CountThings options specified in order for output CSV to have required fields.

2. On the Settings “Save | Where to Save” screen (Figure SOP19.2):
3. Specify “Results Root Folder” as
[\\sean.glba.nps.gov\Data\SEAN_Data\Work_Zone\SO\SO_I\yyyy](\\sean.glba.nps.gov\Data\SEAN_Data\Work_Zone\SO\SO_I\yyyy)
4. Check the “Is Network Path” box.
5. Set “Save Folder Structure” to Year.
6. Select “Specific Folder” and name it Random.

Figure SOP19.2. CountThings settings | save screen.

4. Start up the ACDSee application.
5. For each CSV in the SO_D product:

1. Open the CSV in Excel.
2. Sort the whole table by Photo_File_Name.
3. Use Excel's advanced filter tool to show only those rows where Adult_Count >0 or Pup_Count >0.
4. Review the Photo_File_Name column and hide all rows except where the filenames differ from each other by 1 (i.e., images that are adjacent and may have overlap).
5. For each pair of candidate image files shown on the Excel screen:
 1. Identify the overlapping areas of each file pair using ACDSee. If there are any otters in either file's overlap zone:
 1. Count the otters within the overlapping area as illustrated in SOP 8.5.
 2. Fill in the form fields as illustrated in SOP 8 Figure SOP8.17 and additionally:
 1. DETECTION_GROUP is a unique number assigned to each pair of consecutive, overlapping images selected for this analysis. Set it at 1 for the first pair and then increment by 1 for each new pair.
 2. DETECTION_REPETITION is a number differentiating the repeated counts of each detection group. Always set this to 1 for the first image and 2 for the second image of the pair – no other values are allowed.
 3. After counting the first repetition of a group, click Save&Next to save the count and open the second image.
 4. After counting the second repetition of a group, click Save.
 2. Repeat this for all filename pairs shown in Excel.
6. Repeat this for all CSV files.
6. Close ACDSee, CountThings, and Excel.
7. Merge the created component SO_I CSV files into one ZIP file using Windows Explorer or similar tool.
8. Name the resulting file SO_I_yyyy.ZIP where yyyy is the survey year.
9. Submit to data manager for product validation by email request.
 1. Specify the survey year to be validated.
 2. The data manager will know where to find the file.
2. Data Manager tasks
 1. Create a submission log entry using the tool at http://sean-dm.glba.nps.gov/0_submission_update.aspx.
 2. Create a folder named [\\sean.glba.nps.gov\Data\SEAN_Data\Staging\SO\SO_I\sss\](http://sean.glba.nps.gov/Data/SEAN_Data/Staging/SO/SO_I/sss/) where ssss is the submission number assigned by the tool and copy the candidate from the work zone.
 3. Perform validation against criteria specified in appendix A.
 4. Report results to project leader.
3. Project leader tasks
 1. If submission is not valid
 1. Using CountThings software edit corrections based on researcher expertise until product appears to be in valid state.

2. For rows in the file which are uncorrectable, set their QUALITY_FLAG attribute to '1' if a mandatory field is null, '2' if it's a duplicate record, or '3' for any other fault.
3. Resubmit to data manager for another validation attempt.
2. Once submission is marked valid then the review final product for acceptance.
 1. If not of adequate quality, despite meeting mandatory validation criteria, notify data manager to withdraw the current candidate from further consideration.
 2. If judged to be of best quality then notify data manager it is accepted for public dissemination.
4. Data manager tasks
 1. If project leader wishes the deliverable withdrawn then mark it withdrawn in the submission log and inform project leader.
 2. If project leader accepts the candidate
 1. Install the SO_I zip file in Data Store repository using reference type Tabular Data.
 1. If sensitive information is not present then make the repository entry available to public.
 2. If it is sensitive then restrict the reference to SEAN staff.
 2. Install in the SEAN production web site.
 1. If sensitive information is present then have the product's web link indicate the product is not available instead of accessing the deliverable file.
 3. Record product status in tracking tables.
 4. Update the submission log for this candidate.
 5. Inform project leader the deliverable has been deployed.
 6. Evaluate server storage usage. If space is running short and the SO_I is not going to be revised, the CountThings CNT files may be deleted. CNT files are very large and no longer needed after all edits are complete and the SO_I is final.

Purpose of Deliverable

Frequency Produced

Prerequisites

The full set of SO C geocoded photos must be accepted before SO I can be built.

SEAN Sea Otters

Deliverable SO_I: Detection count data

```
graph TD
    subgraph Project_Staff [Project Staff]
        PS_Path["\\sean.giba.nps.gov\Data\SEAN_Data\  
Work_Zone\SO\SO_1\yyyy\"]
        PS_CSV[CSV]
        PS_Zip[Zip package and submit]
        PS_Appl[Apply corrections]
        PS_Count[Count selected photo pairs]
        PS_Limit[Limit to pairs having  
overlap areas that  
contain otters]
        PS_SO_Cs[Selected  
SO_Cs]
        PS_SO_D_csv[SO_D csv files]
        PS_Photos[photo filenames]
        PS_Select[Select photo pairs  
where both have otters]
        PS_Unzip[Retrieve and unzip SO_D]
        PS_Accepted_SO_D[Accepted  
SO_D]
        PS_Accepted_SO_C[Accepted  
SO_C]
        PS_Photo_Repo[PHOTO REPOSITORY]
    end

    subgraph Data_Manager [Data Manager]
        DM_Candidate[Candidate submission  
zip package]
        DM_Validation[Formal validation]
        DM_Errors[Error  
notices]
        DM_Exception[exception_notices]
        DM_Log[submission_log]
        DM_Status_Log[Status]
        DM_Install[Install deliverable]
        DM_Status_Install[Status]
        DM_Track[Track progress]
        DM_SO_I_Log[SO_I]
        DM_Update[Update metadata]
        DM_NWS[Network Web Site]
        DM_NPS_Store[Data Manager]
    end

    PS_Path --> PS_Zip
    PS_Path --> PS_Appl
    PS_Path --> PS_Count
    PS_Path --> PS_Limit
    PS_Path --> PS_SO_D_csv
    PS_Path --> PS_Photos
    PS_Path --> PS_Select
    PS_Path --> PS_Unzip

    PS_Zip --> DM_Candidate
    DM_Candidate --> DM_Validation
    DM_Validation --> DM_Errors
    DM_Errors --> DM_Exception
    DM_Exception --> PS_Appl
    DM_Validation --> DM_Log
    DM_Log --> DM_Status_Log
    DM_Status_Log --> DM_Install
    DM_Install --> DM_Status_Install
    DM_Status_Install --> DM_Track
    DM_Track --> DM_SO_I_Log
    DM_SO_I_Log --> DM_Update
    DM_Update --> DM_NWS
    DM_Update --> DM_NPS_Store

    PS_Accepted_SO_C --> PS_Photo_Repo
    PS_Photo_Repo --> PS_Select
    PS_Select --> PS_Count
    PS_Count --> PS_SO_Cs
    PS_SO_Cs --> PS_Limit
    PS_Limit --> PS_SO_D_csv
    PS_SO_D_csv --> PS_Unzip
    PS_Unzip --> PS_Accepted_SO_D
    PS_Accepted_SO_D --> PS_Path
```

The flowchart illustrates the data processing workflow for SEAN Sea Otters, divided into two main sections: Project Staff and Data Manager.

Project Staff Section (Left):

- PHOTO REPOSITORY** (Yellow box) provides **Accepted SO_C** to the **Limit to pairs having overlap areas that contain otters** step.
- Limit to pairs having overlap areas that contain otters** (Oval) outputs **Selected SO_Cs** to the **Count selected photo pairs** step.
- Count selected photo pairs** (Oval) outputs to the **photo filenames** (Underlined box).
- photo filenames** (Underlined box) outputs to the **Select photo pairs where both have otters** step.
- Select photo pairs where both have otters** (Oval) outputs to the **SO_D csv files** (Underlined box).
- SO_D csv files** (Underlined box) outputs to the **Retrieve and unzip SO_D** step.
- Retrieve and unzip SO_D** (Oval) outputs **Accepted SO_D** to the **\\sean.giba.nps.gov\Data\SEAN_Data\Work_Zone\SO\SO_1\yyyy** (Underlined box).
- \\sean.giba.nps.gov\Data\SEAN_Data\Work_Zone\SO\SO_1\yyyy** (Underlined box) is the central data storage for the Project Staff section.
- Zip package and submit** (Oval) receives input from the central storage and outputs a **Candidate submission zip package** to the Data Manager section.
- Apply corrections** (Oval) receives input from the central storage and outputs **exception_notices** (Underlined box) to the Data Manager section.

Data Manager Section (Right):

- Candidate submission zip package** (Text) is received from the Project Staff and leads to **Formal validation** (Oval).
- Formal validation** (Oval) outputs **Valid detection data** to the **Install deliverable** step and **Error notices** to the **exception_notices** (Underlined box).
- exception_notices** (Underlined box) outputs to the **Apply corrections** step in the Project Staff section.
- Formal validation** (Oval) outputs **Status** to the **submission_log** (Underlined box).
- submission_log** (Underlined box) outputs **Status** to the **Install deliverable** step.
- Install deliverable** (Oval) outputs **Status** to the **Track progress** step.
- Track progress** (Oval) outputs **SO_I** to the **Update metadata** step.
- Update metadata** (Oval) outputs **SO_I** to the **Network Web Site** (Yellow box) and the **NPS DATA STORE** (Yellow box).
- Update metadata** (Oval) outputs **SO_I** to the **Data Manager** (Yellow box).

Rev: 07 November 2017

Figure SOP-19.A.1 Data flow required to generate deliverable SO₂ detection count data.

Deliverable definition forms

Form D: Tabular Data Deliverable Description

<i>Vital Sign:</i> SO Sea Otters	<i>Deliverable ID:</i> SO_I	<i>Deliverable Title:</i> Detection count data
<i>File format:</i> CSV files packaged as ZIP	<i>Associated software and version:</i> CountThings 2.0 or greater	<i>Revision Date</i> 11-02-2017
<i>Expected frequency:</i> 1 zip file of ~200 rows / year	<i>Submission unit:</i> Survey year	<i>ID of first protocol package this applies to:</i> SO-2017.1
<i>What purpose does this deliverable serve?</i> Provides counts of sea otter adults and pups, locations, as well as covariates ascertained from a subset of overlapping SO_C photos for one particular survey effort. These data are subsequently analyzed to obtain sea otter estimates of detection probability which informs the abundance estimation process.		
<i>Authoritative repository:</i> NPS Data Store - one combined ZIP file per survey effort is booked using reference type Tabular Data.		
<i>Identifiers of relations that compose the tabular deliverable (“Relations” are tables or files that provide information which may be represented in a grid format. Each relation listed must be fully defined in its own accompanying Form X.):</i> SO_I_YYYYMMDD_t.CSV, where YYYY is 4-digit year of this aerial survey, MM is the 2-digit month, DD is the 2-digit day, and t is the survey type (A, O, R, or X). Should it ever be necessary to include data from more than one day in one CSV, YYYYMMDD should reflect the earliest date present. The file name must always be exactly 19 characters long. All CSVs for a survey effort are then zipped into one file named SO_I_YYYY.ZIP.		
<i>Deliverable ID of any other SEAN data products required to create this product:</i> The complete SO_C photo set for this survey effort must be in accepted state prior to building SO_I. The accepted SO_D count data deliverable must also be available in order to identify candidate detection group image pairs.		
<i>Description and source of any outside data required to create this product:</i> None.		

Form X: Relation Definition

<i>Vital Sign:</i> SO Sea otters	<i>Relation identifier:</i> SO_I_YYYYMMDD_t.CSV	<i>Used by deliverable ID:</i> SO_I																		
<i>Revision date / original protocol version:</i> 11-01-2017 / SO-2017.1	<i>Type of relation:</i> ☐ Database table ☒ Data file	<i>Estimated rows:</i> 200/year																		
<i>Primary key for this relation:</i> PHOTO_TIMESTAMP																				
<i>Purpose:</i> Provide sea otter survey counts and covariates by time and location from selected overlapping photos to inform the sea otter population estimation process.																				
<i>Identifiers of attributes defined over this relation ("Attributes" are columns of the grid. Each attribute must be defined in an accompanying Form Y.):</i> The first line of each file consists only of the special attribute <table border="1"> <tr> <td>HEADER</td> </tr> </table>			HEADER																	
HEADER																				
The remaining lines contain these attributes: <table border="1"> <tr> <td>PHOTO_FILE_NAME</td> <td>PHOTO_TIMESTAMP</td> </tr> <tr> <td>LATITUDE_WGS84</td> <td>LONGITUDE_WGS84</td> </tr> <tr> <td>ALTITUDE</td> <td>SURVEY_TYPE</td> </tr> <tr> <td>COUNT_ADULT</td> <td>COUNT_PUP</td> </tr> <tr> <td>KELP_PRESENT</td> <td>LAND_PRESENT</td> </tr> <tr> <td>IMAGE_QUALITY</td> <td>COUNTED_BY</td> </tr> <tr> <td>COUNTED_DATE</td> <td>PROTOCOL_ID</td> </tr> <tr> <td>QUALITY_FLAG</td> <td>DETECTION_GROUP</td> </tr> <tr> <td>DETECTION_REPETITION</td> <td></td> </tr> </table>			PHOTO_FILE_NAME	PHOTO_TIMESTAMP	LATITUDE_WGS84	LONGITUDE_WGS84	ALTITUDE	SURVEY_TYPE	COUNT_ADULT	COUNT_PUP	KELP_PRESENT	LAND_PRESENT	IMAGE_QUALITY	COUNTED_BY	COUNTED_DATE	PROTOCOL_ID	QUALITY_FLAG	DETECTION_GROUP	DETECTION_REPETITION	
PHOTO_FILE_NAME	PHOTO_TIMESTAMP																			
LATITUDE_WGS84	LONGITUDE_WGS84																			
ALTITUDE	SURVEY_TYPE																			
COUNT_ADULT	COUNT_PUP																			
KELP_PRESENT	LAND_PRESENT																			
IMAGE_QUALITY	COUNTED_BY																			
COUNTED_DATE	PROTOCOL_ID																			
QUALITY_FLAG	DETECTION_GROUP																			
DETECTION_REPETITION																				
<i>Mandatory validation criteria involving multiple attributes:</i> QUALITY_FLAG must be present and greater than '0' if in a record: • A required attribute is null, or • Any attribute fails a mandatory validation criterion, but cannot be corrected with a valid value.																				
<i>Optional validation criteria involving multiple attributes:</i> None.																				

Form Y: Attribute Definition

<i>Vital Sign:</i> SO Sea otters	<i>Attribute identifier:</i> HEADER	<i>Used by deliverable ID:</i> SO_I
<i>Revision date / protocol version:</i> 10-23-2017 / SO-2017.1	<i>Default report heading:</i> [n/a]	<i>Relation (from Form X):</i> SO_I_yyyymmdd_t.CSV
<i>Purpose:</i> Heading containing fixed keywords used to designate content of columns in remainder of file.		
<i>Data type:</i>	varchar(500)	
<i>Maximum length</i>	500	
<i>Required:</i>	yes	
<i>Measurement units:</i>	n/a	
<i>Format:</i>	unformatted string	
<i>Mandatory validation rules for this attribute (in order of application):</i>	1. Must contain all of the following substrings: PHOTO_FILE_NAME, PHOTO_TIMESTAMP, LATITUDE_WGS84, LONGITUDE_WGS84, ALTITUDE, SURVEY_TYPE, COUNT_ADULT, COUNT_PUP, KELP_PRESENT, LAND_PRESENT, IMAGE_QUALITY, COUNTED_BY, COUNTED_TIMESTAMP, PROTOCOL_ID, QUALITY_FLAG, DETECTION_GROUP, DETECTION_REPETITION	
<i>Optional validation rules for this attribute:</i>	None	

Form Y: Attribute Definition

<i>Vital Sign:</i> SO Sea otters	<i>Attribute identifier:</i> PHOTO_FILE_NAME	<i>Used by deliverable ID:</i> SO_I
<i>Revision date / protocol version:</i> 10-23-2017 / SO-2017.1	<i>Default report heading:</i> Photo File	<i>Relation (from Form X):</i> SO_I_yyyymmdd_t.CSV
<i>Purpose:</i> Name of the SO_C photo image file that was examined.		
<i>Data type:</i>	Varchar(24)	
<i>Maximum length</i>	24	
<i>Required:</i>	yes	
<i>Measurement units:</i>	n/a	
<i>Format:</i>	n/a	
<i>Mandatory validation rules for this attribute (in order of application):</i>	1. Must follow the format for a valid Windows file name. 2. Must be unique.	
<i>Optional validation rules for this attribute:</i>	1. Should follow the required format specified for photo files in SOP 6, (currently SO_C_yyyymmdd_t_####.JPG).	

Form Y: Attribute Definition

<i>Vital Sign:</i> SO Sea otters	<i>Attribute identifier:</i> PHOTO_TIMESTAMP	<i>Used by deliverable ID:</i> SO_I
<i>Revision date / protocol version:</i> 10-23-2017 / SO-2017.1	<i>Default report heading:</i> Photo Timestamp	<i>Relation (from Form X):</i> SO_I_yyyymmdd_t.CSV
<i>Purpose:</i> Date and time the photo was taken; in the local Alaska time zone using the 24-hour clock.		
<i>Data type:</i>	Varchar(19)	
<i>Maximum length</i>	19	
<i>Required:</i>	Yes	
<i>Measurement units:</i>	Date and time	
<i>Format:</i>	yyyy-mm-dd hh:mm:ss	
<i>Mandatory validation rules for this attribute (in order of application):</i>	1. Must be unique. 2. Must represent a valid a date and time. 3. Must not be a timestamp for a period beyond the one current at validation. 4. Must not be a date occurring before year 2017.	
<i>Optional validation rules for this attribute:</i>	1. Month part of date should be between May and August	

Form Y: Attribute Definition

<i>Vital Sign:</i> SO Sea otters	<i>Attribute identifier:</i> LATITUDE_WGS84	<i>Used by deliverable ID:</i> SO_I
<i>Revision date / protocol version:</i> 10-23-2017 / SO-2017.1	<i>Default report heading:</i> Latitude	<i>Relation (from Form X):</i> SO_I_yyyymmdd_t.CSV
<i>Purpose:</i> Latitude of the camera when photo was taken in decimal degrees using the WGS84 datum.		
<i>Data type:</i>	Varchar(11)	
<i>Maximum length</i>	11	
<i>Required:</i>	yes	
<i>Measurement units:</i>	Decimal degrees	
<i>Format:</i>	99.99999999	
<i>Mandatory validation rules for this attribute (in order of application):</i>	1. Must represent a valid real number.	
<i>Optional validation rules for this attribute:</i>	1. Should be between 58.0 and 60.0.	

Form Y: Attribute Definition

<i>Vital Sign:</i> SO Sea otters	<i>Attribute identifier:</i> LONGITUDE_WGS84	<i>Used by deliverable ID:</i> SO_I
<i>Revision date / protocol version:</i> 10-23-2017 / SO-2017.1	<i>Default report heading:</i> Longitude	<i>Relation (from Form X):</i> SO_I_yyyymmdd_t.CSV
<i>Purpose:</i> Longitude of the camera in decimal degrees using the WGS84 datum.		
<i>Data type:</i>	Varchar(13)	
<i>Maximum length</i>	13	
<i>Required:</i>	yes	
<i>Measurement units:</i>	Decimal degrees	
<i>Format:</i>	-999.99999999	
<i>Mandatory validation rules for this attribute (in order of application):</i>	1. Must represent a valid real number.	
<i>Optional validation rules for this attribute:</i>	1. Should be between -135.0 and -138.0.	

Form Y: Attribute Definition

<i>Vital Sign:</i> SO Sea otters	<i>Attribute identifier:</i> ALTITUDE	<i>Used by deliverable ID:</i> SO_I
<i>Revision date / protocol version:</i> 10-23-2017 / SO-2017.1	<i>Default report heading:</i> Altitude (m)	<i>Relation (from Form X):</i> SO_I_yyyymmdd_t.CSV
<i>Purpose:</i> Altitude of the camera above sea level in meters.		
<i>Data type:</i>	Integer	
<i>Maximum length</i>	3	
<i>Required:</i>	yes	
<i>Measurement units:</i>	Meters	
<i>Format:</i>	999	
<i>Mandatory validation rules for this attribute (in order of application):</i>	1. Must represent a valid integer. 2. Must be greater than zero.	
<i>Optional validation rules for this attribute:</i>	2. Should be between 150 and 300.	

Form Y: Attribute Definition

<i>Vital Sign:</i> SO Sea otters	<i>Attribute identifier:</i> SURVEY_TYPE	<i>Used by deliverable ID:</i> SO_I
<i>Revision date / protocol version:</i> 10-23-2017 / SO-2017.1	<i>Default report heading:</i> Survey Type	<i>Relation (from Form X):</i> SO_I_yyyymmdd_t.CSV
<i>Purpose:</i> Type of survey purpose a particular flight was made for, entered as: • “Abundance” • “Optimal” • “Random” • “External”		
<i>Data type:</i>	Varchar(9)	
<i>Maximum length</i>	9	
<i>Required:</i>	yes	
<i>Measurement units:</i>	n/a	
<i>Format:</i>	n/a	
<i>Mandatory validation rules for this attribute (in order of application):</i>	1. Must be one of “Abundance”, “Optimal”, “Random”, or “External” 2. All rows in a particular CSV file must have the same value.	
<i>Optional validation rules for this attribute:</i>	1. The ‘t’ portion of the file name must correspond to the type (A, O, R, or X).	

Form Y: Attribute Definition

<i>Vital Sign:</i> SO Sea otters	<i>Attribute identifier:</i> COUNT_ADULT	<i>Used by deliverable ID:</i> SO_I
<i>Revision date / protocol version:</i> 10-23-2017 / SO-2017.1	<i>Default report heading:</i> Adults	<i>Relation (from Form X):</i> SO_I_yyyymmdd_t.CSV
<i>Purpose:</i> The number of adult sea otters present in the photo.		
<i>Data type:</i>	Integer	
<i>Maximum length</i>	4	
<i>Required:</i>	no	
<i>Measurement units:</i>	n/a	
<i>Format:</i>	9999	
<i>Mandatory validation rules for this attribute (in order of application):</i>	If present: 1. Must represent a valid integer. 2. Must be greater than or equal to zero. 3. Must be less than 10,000.	
<i>Optional validation rules for this attribute:</i>	1. Should be between 0 and 1,000.	

Form Y: Attribute Definition

<i>Vital Sign:</i> SO Sea otters	<i>Attribute identifier:</i> COUNT_PUP	<i>Used by deliverable ID:</i> SO_I
<i>Revision date / protocol version:</i> 10-23-2017 / SO-2017.1	<i>Default report heading:</i> Pups	<i>Relation (from Form X):</i> SO_I_yyyymmdd_t.CSV
<i>Purpose:</i> The number of immature sea otters present in the photo.		
<i>Data type:</i>	Integer	
<i>Maximum length</i>	4	
<i>Required:</i>	no	
<i>Measurement units:</i>	n/a	
<i>Format:</i>	9999	
<i>Mandatory validation rules for this attribute (in order of application):</i>	If present: 1. Must represent a valid integer. 2. Must be greater than or equal to zero. 3. Must be less than 10,000.	
<i>Optional validation rules for this attribute:</i>	1. Should be between 0 and 1,000.	

Form Y: Attribute Definition

<i>Vital Sign:</i> SO Sea otters	<i>Attribute identifier:</i> KELP_PRESENT	<i>Used by deliverable ID:</i> SO_I
<i>Revision date / protocol version:</i> 10-23-2017 / SO-2017.1	<i>Default report heading:</i> Kelp	<i>Relation (from Form X):</i> SO_I_yyyymmdd_t.CSV
<i>Purpose:</i> Whether or not surface kelp is visible in the photo: • 0 = No • 1 = Yes		
<i>Data type:</i>	Varchar(1)	
<i>Maximum length</i>	1	
<i>Required:</i>	no	
<i>Measurement units:</i>	n/a	
<i>Format:</i>	n/a	
<i>Mandatory validation rules for this attribute (in order of application):</i>	1. If present, must be either '0' or '1'.	
<i>Optional validation rules for this attribute:</i>	None	

Form Y: Attribute Definition

<i>Vital Sign:</i> SO Sea otters	<i>Attribute identifier:</i> LAND_PRESENT	<i>Used by deliverable ID:</i> SO_I
<i>Revision date / protocol version:</i> 10-23-2017 / SO-2017.1	<i>Default report heading:</i> Land	<i>Relation (from Form X):</i> SO_I_yyyymmdd_t.CSV
<i>Purpose:</i> Whether or not dry land is visible in the photo: • 0 = No • 1 = Yes		
<i>Data type:</i>	Varchar(1)	
<i>Maximum length</i>	1	
<i>Required:</i>	no	
<i>Measurement units:</i>	n/a	
<i>Format:</i>	n/a	
<i>Mandatory validation rules for this attribute (in order of application):</i>	1. If present, must be either '0' or '1'.	
<i>Optional validation rules for this attribute:</i>	None	

Form Y: Attribute Definition

<i>Vital Sign:</i> SO Sea otters	<i>Attribute identifier:</i> IMAGE_QUALITY	<i>Used by deliverable ID:</i> SO_I
<i>Revision date / protocol version:</i> 11-02-2017 / SO-2017.1	<i>Default report heading:</i> Image Quality	<i>Relation (from Form X):</i> SO_I_yyyymmdd_t.CSV
<i>Purpose:</i> Reader's evaluation of image quality: 'Good', 'Reduced', or 'Unusable'. Reduced indicates issues such as blurry focus that makes an exact count of sea otters difficult. Unusable indicates an issue such as file corruption that prevents the image from being at all recognizable.		
<i>Data type:</i>	Varchar(8)	
<i>Maximum length</i>	8	
<i>Required:</i>	no	
<i>Measurement units:</i>	n/a	
<i>Format:</i>	n/a	
<i>Mandatory validation rules for this attribute (in order of application):</i>	If present, must be either 'Good', 'Reduced', or 'Unusable'.	
<i>Optional validation rules for this attribute:</i>	None	

Form Y: Attribute Definition

<i>Vital Sign:</i> SO Sea otters	<i>Attribute identifier:</i> COUNTED_BY	<i>Used by deliverable ID:</i> SO_I
<i>Revision date / protocol version:</i> 10-23-2017 / SO-2017.1	<i>Default report heading:</i> Counted by	<i>Relation (from Form X):</i> SO_I_yyyymmdd_t.CSV
<i>Purpose:</i> Initials of the technician who read this photo.		
<i>Data type:</i>	Varchar(3)	
<i>Maximum length</i>	3	
<i>Required:</i>	no	
<i>Measurement units:</i>	n/a	
<i>Format:</i>	n/a	
<i>Mandatory validation rules for this attribute (in order of application):</i>	None	
<i>Optional validation rules for this attribute:</i>	1. Should be present.	

Form Y: Attribute Definition

<i>Vital Sign:</i> SO Sea otters	<i>Attribute identifier:</i> COUNTED_DATE	<i>Used by deliverable ID:</i> SO_I
<i>Revision date / protocol version:</i> 10-23-2017 / SO-2017.1	<i>Default report heading:</i> Counted on	<i>Relation (from Form X):</i> SO_I_yyyymmdd_t.CSV
<i>Purpose:</i> Date the photo was read; in the local Alaska time zone using the 24-hour clock.		
<i>Data type:</i>	Varchar(19)	
<i>Maximum length</i>	19	
<i>Required:</i>	no	
<i>Measurement units:</i>	time	
<i>Format:</i>	yyyy-mm-dd	
<i>Mandatory validation rules for this attribute (in order of application):</i>	If present: 1. Must represent a valid a date. 2. Must not be a date beyond the one current at validation. 3. Must not be a date occurring before year 2017.	
<i>Optional validation rules for this attribute:</i>	1. Should be present.	

Form Y: Attribute Definition

<i>Vital Sign:</i> SO Sea otters	<i>Attribute identifier:</i> PROTOCOL_ID	<i>Used by deliverable ID:</i> SO_I
<i>Revision date / protocol version:</i> 10-23-2017 / SO-2017.1	<i>Default report heading:</i> Protocol	<i>Relation (from Form X):</i> SO_I_yyyymmdd_t.CSV
<i>Purpose:</i> The SEAN sea otter monitoring program protocol package ID that was followed when creating this deliverable. For example, 'SO-2017.1'. The protocol package ID value must correspond to a protocol package ID defined in NPS Data Store under the deliverable SO_A reference.		
<i>Data type:</i>	Varchar(16)	
<i>Maximum length</i>	16	
<i>Required:</i>	yes	
<i>Measurement units:</i>	n/a	
<i>Format:</i>	n/a	
<i>Mandatory validation rules for this attribute (in order of application):</i>	1. Must be a protocol package ID already defined in NPS Data Store.	
<i>Optional validation rules for this attribute:</i>	1. Should be the same value in all records within a single file.	

Form Y: Attribute Definition

<i>Vital Sign:</i> SO Sea otters	<i>Attribute identifier:</i> QUALITY_FLAG	<i>Used by deliverable ID:</i> SO_I
<i>Revision date / protocol version:</i> 10-23-2017 / SO-2017.1	<i>Default report heading:</i> Record Quality	<i>Relation (from Form X):</i> SO_I_yyyymmdd_t.CSV
<i>Purpose:</i> This attribute indicates whether there is a technical fault in the data row making it unsuitable for analysis purposes. If this attribute is null or '0', then every attribute in the record meets the mandatory validation criteria. If this attribute is '1', then at least one required attribute is missing. If this attribute is '2', then the photo file name or timestamp is not unique. If this attribute is '3', then some other mandatory quality requirement was violated.		
<i>Data type:</i>	Varchar(1)	
<i>Maximum length</i>	1	
<i>Required:</i>	no	
<i>Measurement units:</i>	n/a	
<i>Format:</i>	n/a	
<i>Mandatory validation rules for this attribute (in order of application):</i>	1. If present, must be either '0', '1', '2' or '3'.	
<i>Optional validation rules for this attribute:</i>	None	

Form Y: Attribute Definition

<i>Vital Sign:</i> SO Sea otters	<i>Attribute identifier:</i> DETECTION_GROUP	<i>Used by deliverable ID:</i> SO_I
<i>Revision date / protocol version:</i> 11-03-2017 / SO-2017.1	<i>Default report heading:</i> Group	<i>Relation (from Form X):</i> SO_I_yyyymmdd_t.CSV
<i>Purpose:</i> The overlap group number. Detection estimation requires using two adjacent photos, counting the number of otters shown in the area of each photo where the two spatially overlap. There are always two members in a group so two records in the CSV are always present having the same group number.		
<i>Data type:</i>	Integer	
<i>Maximum length</i>	4	
<i>Required:</i>	yes	
<i>Measurement units:</i>	n/a	
<i>Format:</i>	9999	
<i>Mandatory validation rules for this attribute (in order of application):</i>	1. Must be an integer between 1 and 9,999. 2. There must be exactly two rows in the CSV having each particular group number.	
<i>Optional validation rules for this attribute:</i>	None.	

Form Y: Attribute Definition

<i>Vital Sign:</i> SO Sea otters	<i>Attribute identifier:</i> DETECTION_REPETITION	<i>Used by deliverable ID:</i> SO_I
<i>Revision date / protocol version:</i> 11-03-2017 / SO-2017.1	<i>Default report heading:</i> Repetition	<i>Relation (from Form X):</i> SO_I_yyyymmdd_t.CSV
<i>Purpose:</i> The sequential number this photo is assigned within its DETECTION_GROUP. Detection estimation requires using two adjacent photos and counting the number of otters shown in the area of each photo where the two overlap. One of the photos is assigned DETECTION_REPETITION = 1 and the other is assigned DETECTION_REPETITION = 2.		
<i>Data type:</i>	Varchar(1)	
<i>Maximum length</i>	1	
<i>Required:</i>	yes	
<i>Measurement units:</i>	n/a	
<i>Format:</i>	9	
<i>Mandatory validation rules for this attribute (in order of application):</i>	1. Must be either 1 or 2. 2. For each DETECTION_GROUP there must be one record in the CSV reflecting repetition 1 and one record reflecting repetition 2.	
<i>Optional validation rules for this attribute:</i>	None.	