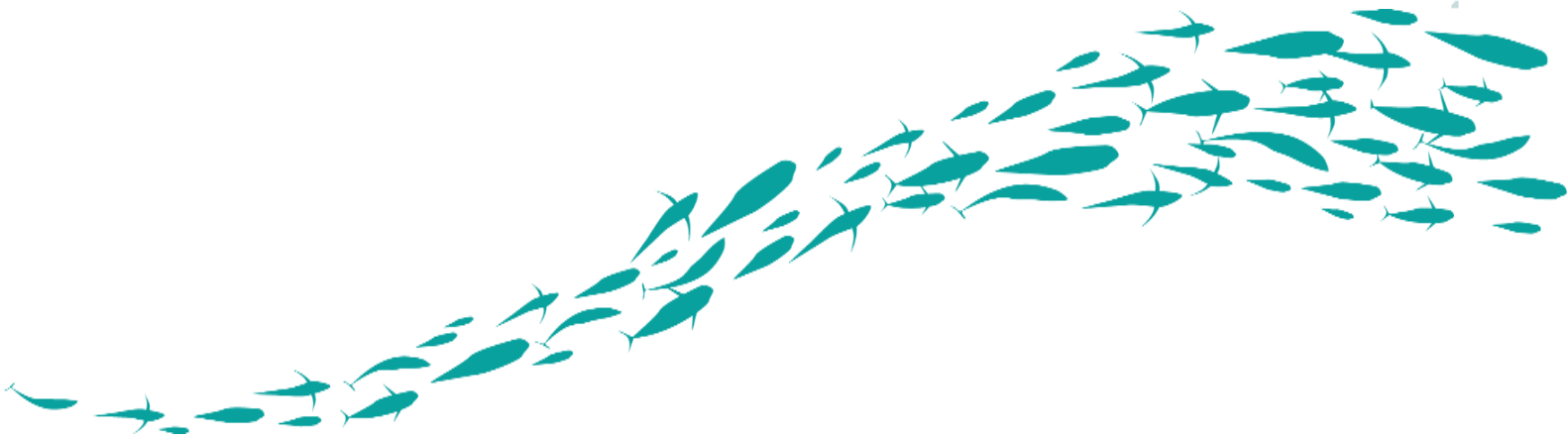




AQUACULTURE STEWARDSHIP COUNCIL GUIDELINES FOR COLLECTING SPATIAL DATA



Aquaculture Stewardship Council (ASC) Guidelines for Collecting Spatial Data

This document is based on the International Social and Environmental Accreditation and Labelling Alliance (ISEAL) guidelines on collecting spatial data; and adapted to meet the specific needs of ASC.

The software recommendations have been gathered from the collaborative Geographic Information System (GIS) starter kit tool, composed by ASC, ISEAL, Accreditation Services International (ASI) and the Forest Stewardship Council (FSC). If you would like more background information about GIS and spatial data collection, you are strongly encouraged to review these documents.

The present document is intended for people who already have some experience with spatial data terminology; but it is also intended for auditors to check if their clients have prepared the spatial data collection work in the appropriate fashion.

This document (hereafter referred to as “the Guidelines”) and any other supportive documents will be delivered to the farm before the audit announcement, and the client must submit all requested information within **thirty (30) working days** after the audit to data@asc-aqua.org.

A “common issues” document has been drafted in Annex to guide you through some of the frequently occurring issues arising when it comes to spatial data, as well as solutions.

For users who have no previous experience with spatial data/GIS, ASC has created a tutorial that guides you through all the steps that have to be taken to create the desired output. It is highly recommended that you follow all the steps as described.

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Version control

The Aquaculture Stewardship Council (ASC) is the owner of this document. For comments or questions regarding the content of this document, please contact ASC via: data@asc-aqua.org.

Version history:

| Version | Published date | Remarks |
|---------|----------------------------------|------------------|
| V1.0 | November 1 st 2019 | Original version |

1. Types of location data

Sites or locations can be represented geographically as points or areas, the latter called “polygons”. Depending on availability of data, the area and the scale is to be displayed.

1.1 Point

A point is a dimensionless feature (i.e. it has no area) represented by a pair of latitude/longitude coordinates. Points are easy to manage since all they require are two (2) columns in a data table. A location point can easily be captured with a global positioning system (GPS); ways to do this are discussed later in the Guidelines.

In the context of ASC, we can use points to represent a farm location that is composed of many production units. It is preferable to capture each production unit individually by collecting location points manually. However due to the characteristics of some aquaculture farms this is sometimes not practicable, so one may resort to placing one (1) point per production unit via web-based solutions (e.g. Figure 1b).

1.2 Polygon

A polygon is a geographic area feature defined by a series of points (or ‘vertices’) that are connected to form a ring (and hence enclose an area). Due to their more complex nature, the management of polygons requires special software, such as a GIS or specialised mapping programme like Google Earth.

Like points, we can use a polygon to represent one or more contiguous production units (Figure 1d), or to represent a landscape of multiple production units (Figure 1c). The difference being for the latter that, in addition to the certified operations, there could be areas *within* the polygon which are not certified.

1.3 Requirements for ASC

In summary, there are four (4) ways to represent certificates geographically, presented here from the most general (least useful) to more specific (and most useful):

- One point representing a farm with many production units (Figure 1a);
- One point for each production unit (Figure 1b);
- One polygon representing all production units within the farm. (Figure 1c);
- One polygon for each production unit (Figure 1d).



Figure 1a - Central point representing a farm with many production units. Taken at farm center



Figure 1b – many points taken at the southwest corner of each production unit



Figure 1c – Polygon with many production units representing the farm boundaries



Figure 1d – One polygon for each production site. Together they make up the farm boundaries

ASC's aim is to accurately represent the spatial location of each production unit individually (i.e. the options represented by figures 1b and 1d). However, due to time constraints this may not always be possible.

Therefore, we are requiring ALL clients to provide *at minimum*:

- One (1) polygon representing the *farm boundaries*, which includes all farm production units as well as other features.
- One (1) *location point* in decimal degrees (six [6] decimals) taken in the centre of the farm.



Figure 2 – The two required methods of submitting spatial data to ASC

Any features that do not fall within the boundary of the farm, even if they are spatially located *within* the said farm (i.e. constituting an enclave), should not be taken into the polygon. This can be achieved by drawing another polygon around the foreign object with a name that clearly states it does not belong within farm property, for instance “foreign object” (see Figure 3).

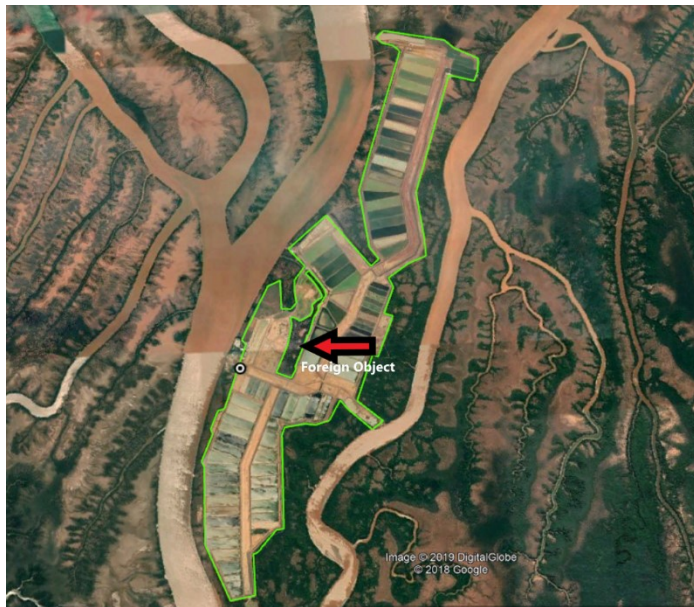


Figure 3 - A foreign object within site boundaries is drawn with a polygon to clearly indicate that it does not belong to the site

2. Collection of location data

Location data can be obtained by either going onsite with a GPS receiver, or by visiting the location virtually using an interactive web-based map. Optimally, these approaches should be combined to obtain certainty of accuracy.

Because this can be very time-consuming, it is advised to first use a web-based solution to see if your data can be captured through it. For uniformity of the data collection process it is advised that all companies use software that has the same features. To ensure that the user has all such necessary features, ASC has developed an app for this purpose. This app is based on high resolution satellite imagery which makes it possible to view most sites from above and map them.

- Go to the app in the “*Online farm mapping tool*” section of the GIS portal, zoom in to your Area of Interest and search for the farm you want to digitize. If you can not find it on



the map due to temporal issues with the map, you can use the “Slide” widget. This widget allows you to choose base maps from a different year and compare them with each other. The layer left to the slider is from 2014, the layer right to the slider is from 2019.

If you locate your farm on any of the layers, put the slider aside and make sure the whole farm is in the picture.

- Is your site clearly visible with all boundaries?
 - If yes, go to chapter **2.1.2**.
 - If the site is visible, but the boundaries are not correct or clear, go to chapter **2.2.2**.
 - If the site is not visible at all, go to chapter **2.2.2**.

2.1 Collecting coordinates

2.1.1 Manually

Most GPS-enabled devices provide latitude/longitude coordinates with an accuracy of around +/-10 metres. Latitude/longitude points should be collected in decimal degrees with the number of decimal places representing the given accuracy (e.g. four decimal places provide an accuracy of 10m). Do note that in decimal degrees the latitudes in the southern hemisphere and longitudes in the western hemisphere (Americas) must be negative.

Many mobile apps essentially turn your smartphone into a GPS-enabled mapping tool. After analysis of the above-described required data, the app for field data collection should have the following characteristics:

- Offline access to a high resolution basemap which supports the pinpointing of features offline in the field (this usually requires that the image must have been previously downloaded and stored onto the device);
- Possibility to run offline in order to collect data in areas without connection and upload them later;
- Polygon, line or point drawing capabilities by hand based on the background image;
- Polygon, line, or point drawing capabilities by GPS location;
- The geographical coordinates are recorded in decimal degrees (longitude and latitude) preferably in the WGS84 reference system;
- Multi-platform;
- Free of charge.

The following '*GPS Essentials*' is an application for Android that is free, easy to use, and which works offline. Latitude/longitude coordinates can be read directly off the phone and recorded as a waypoint for transferring onto your computer.

GPS Essentials

This freely available app provides a suite of location tools, including a tool for collecting points (waypoints).

To make GPS Essentials ready for offline use, do the following:

1. Open GPS Essentials. Go to Settings and select Map Cache. Move the limit of the cache to the maximum.
 2. Find a strong network connection. Select "Portable Maps" from the main screen. Every map that you view in the Portable map mode is automatically stored in the memory of Android. Store maps that you need offline (satellite view is recommended) in as much detail as possible; and zoom-in slowly on each waypoint.
 3. Disconnect from the network and view maps in the Portable map mode. If details are missing in some maps, reconnect to a network and zoom in slowly to the map location you need.
 4. Make sure the GPS is turned 'on' in your Android phone before you use the GPS Essentials app.
- To collect a location point with GPS Essentials, click on the 'Waypoints' icon and then on the orange "plus" button in the bottom right corner (see Figure 4).
 - Next, wait for a moment for your phone to pick up satellites (minimum of four satellites) and improve accuracy. Now, enter the name and description of the waypoint and click "create": you can now read the latitude and longitude location of your point.
 - To create a point for the middle of your site, zoom in until you can clearly distinguish the middle of the site, or if the site is not visible on the map, walk towards the middle of the site and take the waypoint there.
 - You can save your points and export them to your computer. To do this, open the "Waypoints" button, click the three dots in the upper right corner for the pull-down menu and select "Export" to email the data to yourself as a gpx or .kml file. This will be necessary to show to the auditor during audit.

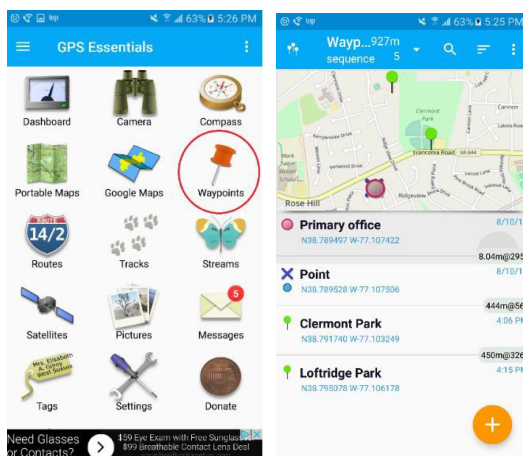



Figure 4 - Recording a waypoint in GPS Essentials app

Manually entering coordinates

In case it is not possible for you to use an app to export a waypoint, you can use Google Maps (or another web based service such as OsmAnd) which is able to track a location (even offline). When the location is determined on the map -- and matches with the physical location that the user is at -- take the coordinates (in decimal degrees, with 6 decimals) and copy them, or write them down and later add them in the ASC GIS app.

Checking for accuracy

Depending on the format in which you have exported your waypoints, you can upload this location data onto a web-based software programme (ASC Online farm mapping tool) to be displayed and checked for accuracy.

- Open the data app and click the “Add data” widget.  Choose “Browse” and choose “all files” as file format. Choose the file .gpx/.kml that you want to import.

If you have (manually) taken your coordinates, please select this file to upload it in the Online farm mapping tool. This is to ensure there is no difference in projection between programmes. The “Add data” widget allows uploading of one thousand (1000) features maximum. If you have more sites than this, please make sure to save it in separate files.

You can now check if the waypoints are at the correct location...

2.1.2 Collecting from web-based software

This freely available web app allows the user to upload existing spatial data (as the gpx/kml files that the user has created in the previous chapter), include tools to digitize features and output these features to be sent to ASC for further processing.

Alternatively, you can use a dedicated GIS programme; particularly if your organisation already has one and someone is trained to use it (Be sure to use WKID 4326!).

The next chapter provides guidelines on how to capture coordinate data using the ASC data app.

Creating new waypoints

The ASC Online farm mapping tool allows you to create waypoints on high-resolution satellite imagery. You can navigate to your farm by searching for the address in the search bar in the upper left corner of the app, or zoom in on the map. Once you located it, make sure your area of interest is fully visible on your screen and follow the next steps:


- On the left, there are widgets. Click the “Draw” widget.



- It will prompt you to choose a draw mode. Click “Point”.
The fields that appear make it possible to provide each point with a name and description. The **name field is mandatory**, because it makes it easier for yourself to keep track of your sites later on. If desired, name the point according to your internal reference system or simply choose the site name.




Place the cursor over the exact middle of the site and zoom in as far as possible until the imagery becomes too blurry to distinguish the borders of the site. Click to secure the waypoint.

- Repeat this step for all sites if you have multiple. The widget will display a list with all the points you have collected.
- If you are ready In the dark grey column, check the white box to select all the points, and click the “Export selected drawings” button.  The file will be named “CentroidPoints.csv” by default, but make sure you change this name to the site name!

2.2. Collecting a polygon

When for all sites a centroid (i.e. geometric centre) point has been taken, the user can start drawing a polygon around the sites.

2.2.1 Collecting polygons with web-based software

Make sure you have the whole site in your screen view, then click the draw widget just like for the previous step. But this time: choose the “polygon” button to start drawing. 

Click with your mouse to add the first point of the polygon and continue to click where the site boundaries are starting to turn to make it more detailed to ‘draw’ the site’s contour (see Figure 5). This method is not exclusively applicable to any type of site shape; therefore it is important to use as much points within the polygon to accurately trace the outline of the site (e.g. a round-shaped site will have a lot more points than a square-shaped site. Once you have covered the whole site, including all production units, name the polygon an appropriate name like “Polygon site name”.



Figure 5 - Creating a polygon with details.

The widget should now contain a list with the polygon (or multiple polygons if it is a multi-site certification). To export the whole folder, click the white square on the left side under “Drawing

list” and click “export selected drawings”. 

The file will be named “FarmBoundaries.json” by default, but make sure you change this name to the site name!

Attach this file to an email and send it to data@asc-aqua.org or submit it through the [GIS portal](#) on our website together with the other required data (See chapter 3).

2.2.2 Collecting polygons from a georeferenced map

If you are trying to draw a polygon, and zoom to your area of interest, it is possible that the site *does not appear* on the mapping software (Online farm mapping tool, GPS Essentials): this can be due to several reasons.

1. **Resolution:** The farm is not clearly/fully visible on the mapping software.
2. **Temporal issues:** the satellite imagery of the software was taken at a time that does not reflect the accuracy or current site boundaries.
3. **The software** does not work on your computer...

The web app has a feature to resolve this; Georeference your map to the basemap and start drawing from there.

Georeferencing is a process of assigning real-world coordinates to an uploaded image. In other words; we will compare identifiable features on the base map layer with the uploaded image, and create a new layer where the uploaded map is part of the basemap. From there you can start drawing your polygons.

To be able to draw from your map, the image should be able to meet the following requirements:

- It can only be uploaded in JPG or PNG format;
- The map has to be drawn to scale;
- Clearly contain the site, including all production units under current certification;

If you are sure your map meets these requirements, you can upload it through the georeference widget.



When you click the widget, a screen shows up that has some explanation of the features that are supported by the widget.

Click the 'Browse' button and navigate to your map.

The map will appear on your screen. In the upper left corner, you will see a hand symbol. If you click down on this you can drag the map across the basemap until you reach the right location.

There is a good chance that the map does not represent the accurate size of your site. This can be adjusted with the lower right corner feature; Resize. Click down and drag the map to resize it to the desired width and length.

The slider bar on top of the map allows you to set the opacity. This makes it possible to see the basemap below you uploaded map, and makes it easier to see if you are almost done with georeferencing your map.

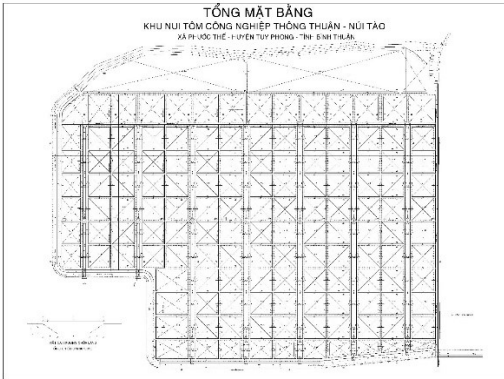


Figure 6 – Georeference widget. Overlaying a map with the Base map to make it possible to capture data in case the farm is not (completely) visible on the base map.

Try to manipulate the map image in a way that it overlaps precisely with the accurate location of your site (see figure 6).

In this version of the mapping app, it is unfortunately not possible to rotate the images with this widget. This means that the map has to be rotated to a correct angle, to fit the base map, with a different program (paint is recommended).

It can take some tries to match the map, but when you are finished click the 'Finish Image Georeferencing' button. The image is now connected to the base map, and you can start drawing your polygon according to the steps in chapter 2.2.1.

3. End products

3.1 Required for all farms

Once each of the steps described in the previous sections have been carefully followed, you should be able to show to the auditor the following files during the audit (see Figure 7):

- ✓ In case **one (1) site** was captured the spatial information must be provided:
 - One (1) .csv file in which the location centre point is stored with a place mark
And
 - One (1) .json file in which the farm boundary is stored with a polygon.
- ✓ In case **multiple sites** were captured the spatial information must be provided:
 - One (1) .csv file in which the location centre points are stored with place marks
And
 - One (1) .json file in which the farm boundaries are stored with polygons.

It is important to export the centre point and polygons separately, otherwise ASC will not be able to process them!

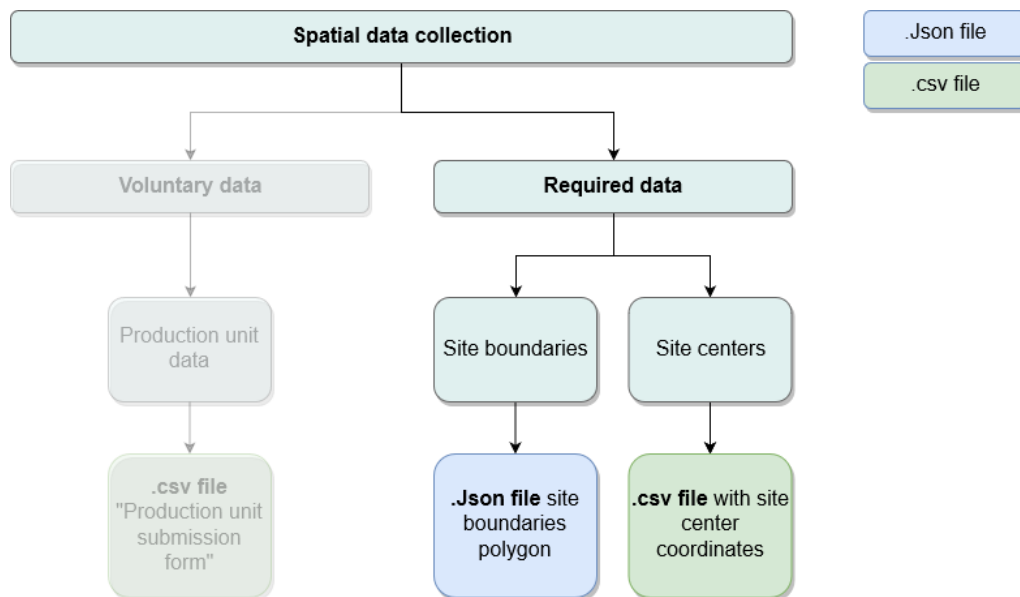


Figure 7 - Flow chart of files to submit to ASC

In case you do not have internet access at the site *during the audit*, but you did collect data with the web-based software, please make sure you provide a screenshot to the auditor of the farm boundaries polygon and production unit points that you have created. If the auditor confirms compliance, you can send the required files (See *Figure 7*) later, when you have access to internet, and as long as it is submitted to ASC before the draft audit report appears online for public consultation.

See figure 9 for proper workflow.


3.2 Capturing voluntary data

The ASC Online farm mapping tool allows you to create waypoints on high-resolution satellite imagery. You can take advantage of this by mapping out all certified production units.

The “draw widget” that you used for capturing the centroid point of your site can also be used to capture production unit coordinates. These can then be transferred to a form to complete data about each production unit (See figure 8).

When opening the “draw widget”, choose the point symbol. The **name field is mandatory**, because it makes it easier for yourself to keep track of your production units later on. If desired, name the point according to your internal reference system or start with number one (1).

Place the cursor over the most southwest corner of a production unit and zoom in as far as possible until the imagery becomes too blurry to distinguish the borders of the production unit. Click to secure the waypoint.

- Repeat this step for all production units. The widget will display a list with all the points you have collected. In the dark grey column, check the white box to select all the points, and click the “Export selected drawings” button.  The file will be named “CentroidPoints.csv” by default, but make sure you **change this name to [site name] ProductionUnits!**

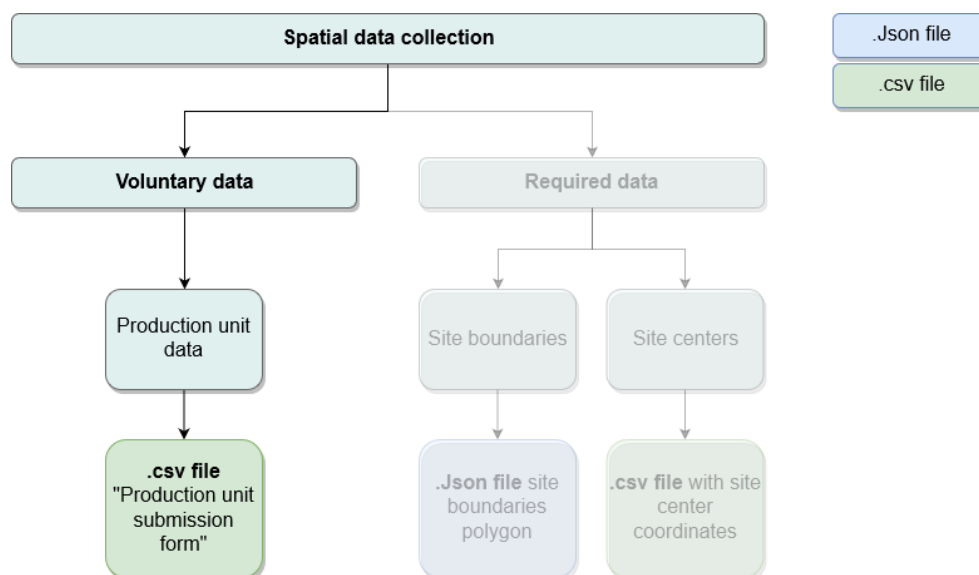



Figure 8 - Flowchart of voluntary data to submit to ASC

Production unit submission form

In case you have captured data on a production unit level, the waypoints should be submitted to ASC as a '.csv' file as well as via the "Production unit submission form".

The submission form is in Excel format, and there is an easy solution to getting the coordinates from the .csv file in Production unit submission form. Follow the steps described below:

- 1) Navigate to the .csv file with the waypoints, select it and click "open";
- 2) The file opens with the columns; x, y, name and description in the first row. These will become the column headers later on.
- 3) Click the top of the first column so that it is entirely selected (click 'A').
- 4) When the column is selected, click the 'Data' tab from the green ribbon.
- 5) In the section "Data tools" click "Text to Column".
- 6) The first step will prompt you to choose a file type to describe your data; select "Delimited" and click "Next".
- 7) Step two lets you choose a delimiter. The data you exported from the .csv file gives a comma as delimiter by default, so select "Comma" and click "Next".
- 8) To make sure the data has the right format when you save it, select "Text" from the list. This only applies to the column that is highlighted in Black. Select the other columns one by one and also set the format to "Text". When all columns are in the right format, click "Finish".
- 9) This should leave you with a sheet that has four (4) separated columns.
- 10) Select the row that has X as a header, but do not take X itself into the selection. If you have selected all production units, press Ctrl+C or right-click your mouse and "Copy".
- 11) Now you will copy and paste these columns into the GIS submission form to fill in the remaining data. Open the Production unit submission form from the data portal on the "Resources" page.
- 12) On the form, under Latitude, right click in the first empty box, and press CTRL+V or right-click your mouse and choose "Paste".
- 13) Do the same for the Y column from the .csv file, and paste this data in the Longitude column in the Production unit submission form.
- 14) Repeat these steps also for the name and paste it in the first column of the Production unit submission form under "Production Unit ID internal system of the farm".
- 15) Fill in the rest of the required data on the form per Production Unit and save the GIS submission form under the name: Production unit submission form <farm name>.
- 16) Make sure when you want to close the .csv file that you **DISCARD** the changes made. This is to make sure that the file remains the same and can be presented to the auditor through the GIS app during the audit. In case there is no internet present at the farm, you will need

to reload the .csv file in the app through the "Add data"  widget, and take a screenshot of the Production Units.

Always check to see if the number of coordinates match up with the number of names, then we can be almost certain that the transfer was done correctly.

3.3 Workflow data capturing process

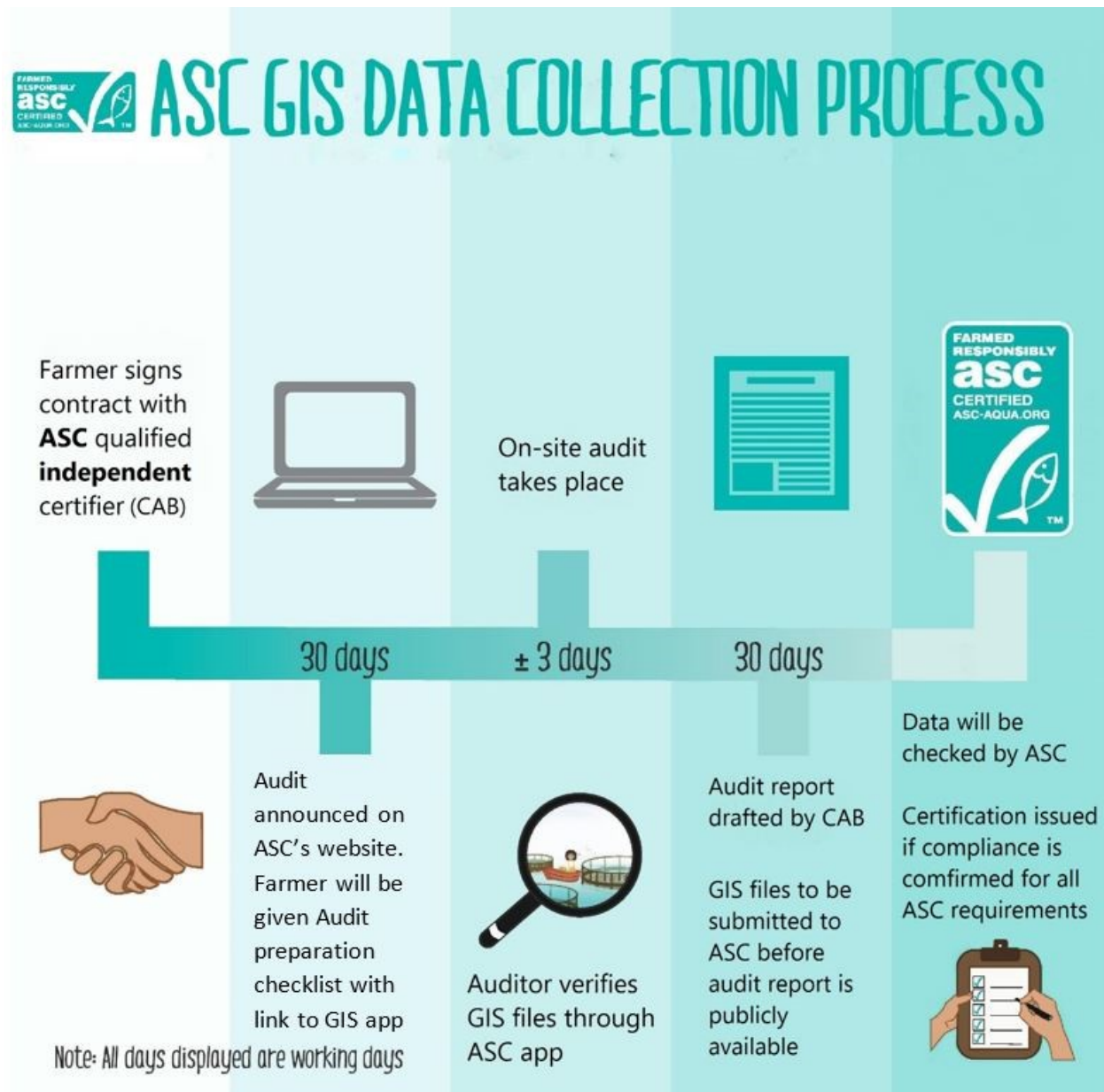




Figure 9 - Workflow collecting spatial data for AS

4. Checking compliance (for auditors)

To check if the farm has gathered the spatial data in a proper manner, they should present the gathered files **during the audit** to the auditor.

The following method is applicable **if internet is present on site**:

- Go to the Online mapping tool through: <https://www.asc-aqua.org/resources/for-farms/gis-portal/>
- Click the “Online farm mapping tool” button, and navigate to the “Draw” widget. 
- In the lower left corner in the “list” tab, click the “Import drawings” button and have the client browse to the correct .Json file. This should be properly named by the client according to the site name (*this must match the site name(s) that was submitted in the audit announcement to ASC!*).
- The polygon(s) should now appear in the list of files. Click the magnifying glass to zoom to the polygon(s) and check for correctness.
- Each polygon should have been marked with a centroid point. These can be added to the map by navigating to the “Add data” widget. 
- have the client browse to the correct .csv file. This should be properly named by the client according to the site name (*this must match the site name(s) that was submitted in the audit announcement to ASC!*).
- Some sites might have collected voluntary data on production unit level. You can check this .csv file data through the “Add data” widget as well.
- If all files accurately represent the site(s) location, the client can submit the files to ASC under the following name:
GIS data [Farm name]

If no internet is present on site:

- The client has captured the data, but the auditor is not able to verify it on site due to internet access problems.
- The guidelines describe that the client should in this case have made a screenshot of the captured data (one (1) polygon and one (1) centroid point per site).
- Please review the screenshot with the polygon and centroid point, just like you would with a map and confirm the geographical information is correct.
- If correct, the client should seek out an internet connection and submit all files to ASC under the following name:
GIS data [Farm name]

All spatial data should be in the possession of ASC before the publication of the draft report!

Annex I. Common issues

This annex provides an overview of the most common issues related to spatial data collection. Some are general to data collection, whilst others are more specific to ASC due to the global and third-party nature of the ASC Certification Programme. Data comes-in from all over the world and can sometimes be interpreted differently by different people. Solutions or workarounds will be provided regarding ASC-related issues.

General

Not following the proper process of data collection

Self-interpretation and improvisations can hamper the quality and efficiency of data collection.

Rushing through reports to save time

Project managers and field data collection team members are encouraged and instructed to save as much time as possible. Doing so ensures that they meet deadlines, exceed expectation and hopefully come-in under budget. However, data collection should never be an area that is 'cut short' or rushed through to accomplish such goal.

Not realising the potential of the data

Even before opening the file, data reporters should think carefully about the potential of a dataset, and what the data can and cannot tell you about a topic. The data is only as good as how it is being collected.

Not checking the data enough

Besides collecting the data required, it is just as important to check the *quality* of the data. By ensuring that the location data is taken *at the correct place* (do check by uploading the coordinates to a different platform and see if they are located on the farm...) it will be a lot easier for others to work with and process the data.

ASC-related issues

Coordinates

ASC is associated with over 1000 certified farms worldwide and receives data from all of them. It is therefore very important that all data be submitted in a uniform format. This makes the process of working with/processing the data a lot easier. For this reason, the GIS Submission form has been restricted to be filled-out *in Decimal Degrees only*. Most GPS collection software can be set to this format, including the ones recommended in these Guidelines.

Despite the format being restricted, there is still the danger of human error creeping in when filling in the coordinates manually. In the past, this translated mostly as coordinates showing up in the wrong hemisphere (see Figure 1); and this is often due to forgetting to add a minus sign (-) to the coordinates when necessary.



Figure 1 - Coordinate of a farm on the wrong hemisphere due to not entering the latitude with a minus (-). The coordinate should have showed up in Chile.

The way to resolve this issue is to keep in mind that:

- ✓ positive latitudes are north of the Equator,
- ✓ negative latitudes are south of the Equator.
- ✓ Positive longitudes are east of Prime Meridian,
- ✓ negative longitudes are west of the Prime Meridian.

Latitude and longitude are usually expressed in that sequence: latitude *before* longitude.

Another common coordinates-related issue encountered is that the coordinates provided are those of the main office of the company, and not those of the production units (see Figure 2).

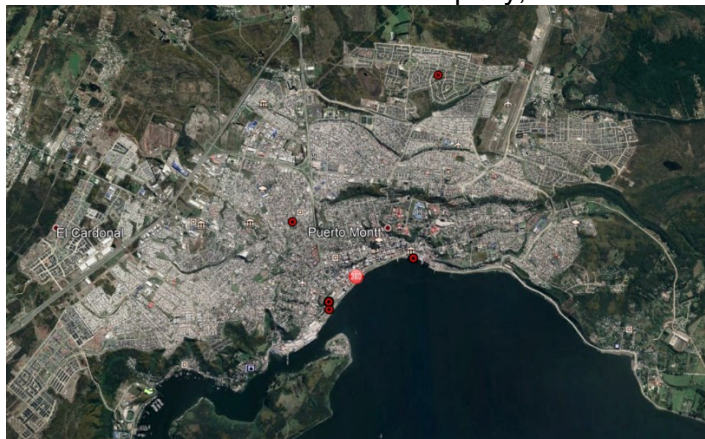


Figure 2 - coordinates taken at the main office instead of the farm

However, the new spatial data requirements make it easier for this issue to be avoided since the guidelines are more descriptive when it comes to *what* should be captured, and *how*...

Polygons

To display farm locations and be able to analyse data from them, one needs to be precise and accurate.

The polygons will deliver this type of accuracy, but only if the requirements are followed. The figures below will explain the difference between a wrong and correct polygon (see Figure 3).



Figure 3 - Polygons around a farm. The one on the left is wrong, the one on the right is correct

Even though the polygon on the left contains the whole farm, it does not meet the ASC requirements because:

- There is a neighbouring farm in the polygon;
- It is unclear which pond belongs to the farm;
- Presence of a natural water body within the polygon without clear indication of the boundaries;
- Area measurements are not accurate.

The polygon on the right is what ASC requires: all features that belong to the farm are included, without containing features from a neighbouring farm. With polygons of this accuracy, ASC can perform analyses.

The best way to achieve such level of precision is to zoom-in while drawing your polygon and *take the time* to trace/draw the outlines with as many points as necessary.