Standard Atlantic Fisheries Information System
System Specification and Requirements
DRAFT

Background

A confluence of federal and state reporting requirements has occurred which has resulted in the creation of a joint state/federal electronic reporting project designed to provide a web-based dealer reporting system that will meet state and federal requirements for regular and quota monitored species.

Historically, timeliness, accuracy and completeness of information have been major issues. The Standard Atlantic Fisheries Information System (SAFIS) is being designed to help resolve these issues.

How SAFIS will work

The complete SAFIS system is composed of an Oracle Forms based front-end interface, tailored for each individual participating program partner, a central landings database, a back-end database (used by the NMFS), and software required to perform data auditing, transformation, and transmittal between the various databases used by SAFIS participants. Additional components provide internal data conversion and distribution for the NMFS and ACCSP data warehouse.

SAFIS front-end systems will provide first line keyed data entry and file upload capabilities for commercial dealers and state agencies through a web-based interface. Using prescribed file formats, dealers may upload records directly to the database, avoiding the need to key records.

Data for federally permitted dealers will be provided to both the front-end and back-end databases as needed. A direct data transfer from the SAFIS database to the NMFS back-end database will be created.

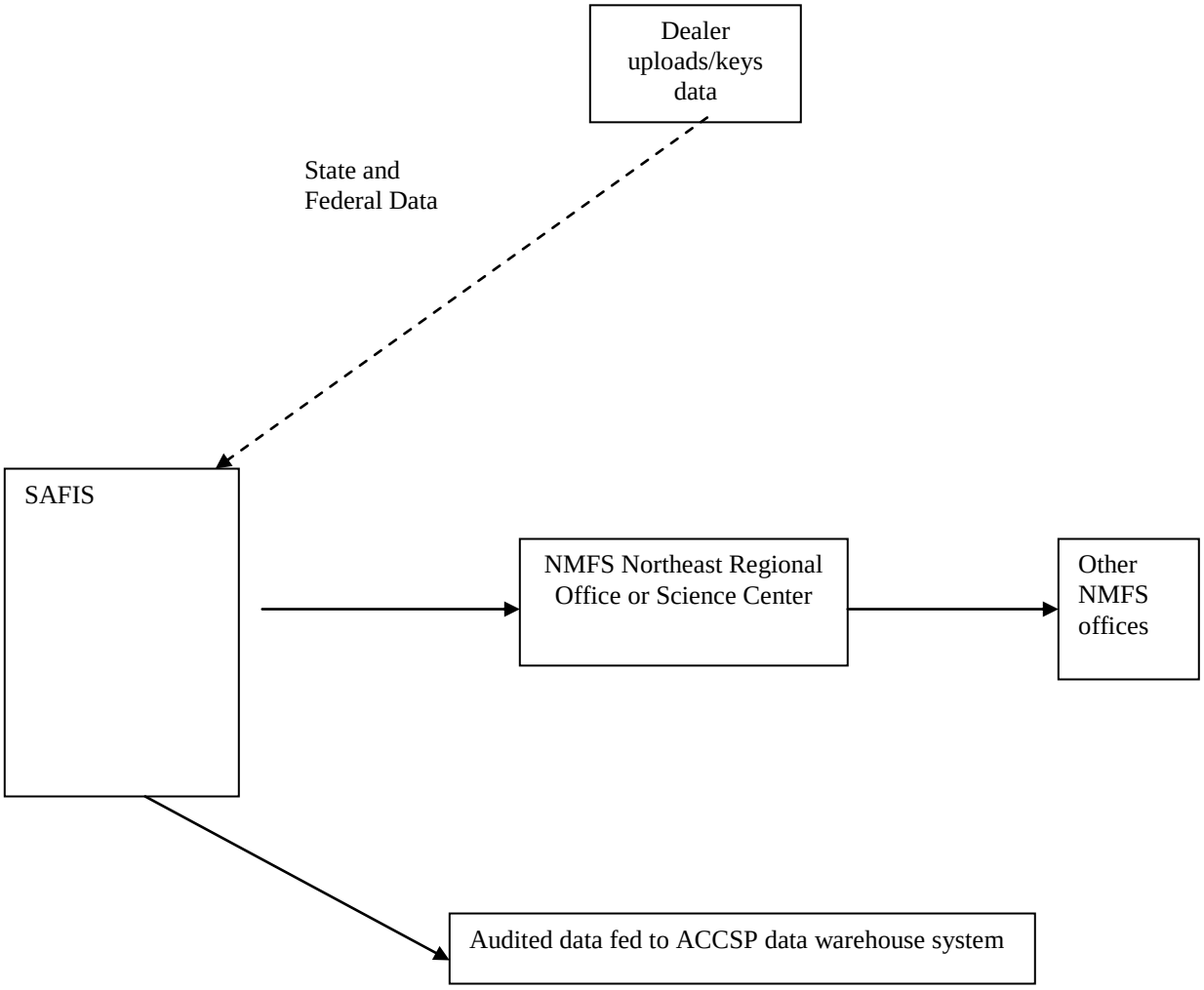
Common quality control and data auditing standards, agreed to by the SAFIS agencies will be used to accomplish data validation, auditing and verification. Quality control will occur during data entry or file upload, auditing will occur after data have been posted to the database.

A common, table-driven auditing process will be run at regular intervals. Appropriate state and federal personnel will review the results of the automated audit, and make corrections to data as required on the SAFIS database. Changed data will be pulled at regular intervals by appropriate external systems. The SAFIS system will include an audit trail to reflect that records have been updated. Audited state records will be made

available to NMFS at trip or summarized levels based on state requirements through the same data interface used to transmit federally permitted dealer data.

Once records for a given period have been audited, state data will be replicated from the state SAFIS application to the ACCSP data warehouse via a transfer process developed by the ACCSP.

Proposed Dataflow for Federally Permitted Dealers



State Specific SAFIS Systems

The ACCSP has been asked by most of the states in New England and the Mid-Atlantic to build and host a version of the SAFIS front end on their behalf. ACCSP is currently in the process of designing and deploying SAFIS versions in Rhode Island, Maryland, New Hampshire and Connecticut. Other states (see chart below) have also requested that ACCSP host SAFIS versions, but are not yet ready to begin working on state specific requirements. At least one state (Massachusetts) expects to host and manage their own version of SAFIS.

Partner Specific Electronic Reporting Implementation

STATE	*E-Reporting*	*Host*	*Imp Date*	*State/Fed Collection*	*State Trip Level*	*Contact*
Maine	SAFIS	ACCSP	5/04	STATE/FED	N/A	David Libby
New Hampshire	SAFIS	ACCSP	Fall//03	STATE/FED	Yes	Cheri Patterson
Connecticut	SAFIS	ACCSP	01/04	STATE/FED	Yes	Mark Alexander
Rhode Island	SAFIS	ACCSP	DONE	STATE/FED	Yes	John Lake
Massachusetts	SAFIS	MA	5/04	STATE/FED	Yes	Tom Hoopes
New York	SAFIS	ACCSP	5/04	STATE/FED	Yes	Byron Young
New Jersey	SAFIS	ACCSP	5/04	STATE/FED	?	Tom Baum
Maryland	SAFIS	ACCSP	DONE	STATE/FED	Yes	Connie Lewis
Delaware	SAFIS	ACCSP	5/04	FED	N/A	Bill Whitmore
Virginia	SAFIS	ACCSP	5/04	FED	N/A	Stephanie Iverson
North Carolina	SWCB	NC	?	STATE/FED	No	Don Hesselman

For Maine, New York, Delaware and Virginia, separate, default versions of SAFIS will be deployed. Initially these systems will be used just to collect federally permitted dealer data. Later, Maine, New York and New Jersey will work with the ACCSP to modify the default versions to include any state specific requirements. Presently Virginia and Delaware do not plan to collect state dealer data.

North Carolina

North Carolina is in the process of developing and deploying a pc based, internet enabled, reporting software. This system will be capable of transmitting dealer data electronically to both North Carolina, and the NMFS. North Carolina has indicated willingness to modify to software to transmit these data directly to the NMFS from federally permitted dealers.

Data Quality Control and Auditing

Background

The transition from paper to electronic means of dealer report submission necessitates that business processes behind the scenes adapt to accommodate greater volumes of data in shorter timeframes. The audit process is critical to dealer information collection, as it controls the quality of the data collected and used for fishery management purposes. The same or a greater level of data quality as is achieved in the paper-based method must be implemented in the electronic audit process.

Electronic submissions – by direct data entry or file upload – enable the collection of more data more often, leaving less time for manual, visual review, edit and approval of data. The auditing process for electronic submissions must therefore be designed to filter has much as possible upon data entry, to automate audits wherever possible, and to facilitate the manual review, edit and notification components of the audit process..

As NMFS partners with state agencies in adopting the SAFIS application for dealer electronic reporting, SAFIS must be upgraded to accommodate both federal and state data quality and audit requirements.

This portion of the document focuses on the minimum audit requirements for SAFIS for dealer electronic reporting. It does not specifically address individual state audit requirements, though there may be some overlap. For the purposes of this document, quality control will represent at-entry or upload data verification, auditing will represent data validation processes occurring after data are entered.

Quality Control and Auditing will be managed via a series of tables that are partner specific. Differing species level validation for quality control purposes can be managed at a partner level through a species verification table accessible via the administrative functions of the system. A similar screen will be made available to control the level of auditing performed by the system which will also be configurable at the partner level.

Common Audit Process

To accommodate state and federal audit requirements, the preferred solution is to develop and apply a common audit process across all users of SAFIS. The use of a common audit process standardizes the quality of data collected, minimizes the number of corrections that need to be applied, and facilitates the edit process between partners. Although

SAFIS instances may vary slightly state to state, a common standard audit process can be maintained. It is anticipated that this process will be a combination of at-entry, automated post-entry, and manual post entry examination of submitted dealer purchase information, and will be table-driven, to allow for variations across state boundaries.

General Quality Control and Auditing Process

Current NMFS Process

The current audit process at NMFS NERO is a combination of at-entry, programmatic post-entry and manual, visual validation of the dealer information collected in the Commercial Online Dealer ES (CODES) application. Upon manual entry or bulk upload, values are checked for ranges and validity upon entry. An integrated audit component performs a series of checks on dealer records in the system, to screen for valid combinations of values and perform checks that cannot be accomplished at data entry. Records that do not pass the audit routines are flagged so that the user may correct them. NMFS field staff then visually review the data for quality with respect to local industry knowledge. When the field staff have completed their review of the data, it is transferred to the central repository.

The SAFIS Audit Process

The new SAFIS application adopted by Mid-Atlantic and New England ACCSP partner agencies must at a minimum employ the same level of quality control and auditing as the latest NMFS CODES application. To implement this level of validation in SAFIS, a combination of entry-form checks, automated procedures, and specialized review and edit screens will be required. The file upload module must apply the same value and range checks that are enforced by the data entry form. The same audit procedures will operate on all data, regardless of mode of entry. Edit screens are required for manual review of data for site, dealer and vessel-specific information for which field knowledge is required – i.e., for all cases that cannot currently be programmatically detected.

The following sections list the general characteristics by category of audit checks:

At-Entry Value and Range Checks (Quality Control)

These are value checks that can readily occur at data entry or file upload. These include checking for a valid value in a lookup table, simple range checks, and enforcement of required fields. In general, at-entry audit checks must be:

- Property or Table driven, such that they may be customized from state to state (from SAFIS instance to SAFIS instance).
- General enough that they can be applied consistently across all federal and state dealers for the SAFIS instance
- Return an online informational message to assist the dealer with correcting the entry

Automated Audit Procedures

Automated audit procedures occur after submission of a set of data, triggered by a successful Commit transaction, or executed on a scheduled, at least daily basis. General requirements for automated procedures include:

- Table driven, so that these may be customized state to state (from SAFIS instance to SAFIS instance)
- Review data with respect to combinations of data elements, i.e. price (value) by species by utilization
- Generate automated notification of any non-acceptable data to the dealer
- Generate automated notification of all informational and/or non-acceptable data to appropriate state and federal parties

Manual Review and Edit Screens

Manual review by field staff is an essential part of the review process, as their knowledge of industry and location specifics cannot be consolidated in a set of computer programs. An edit screen – ideally a set of screens, or a customizable single screen - must be developed to facilitate the field staff review, edit and approval process. The requirements for this stage of audit include:

- Notification of Field staff when one of their dealers submits data. This notification may be triggered by a successful Commit transaction.
- One or more screens (forms) that facilitate bulk review of data
- Edit of data must be allowed from the review screen
- A history of all edits must be maintained. Deleted records should be flagged as such, as opposed to removed from the database.
- Successful edit of data must automatically trigger notification of all appropriate parties.
- Approval of reviewed data must be allowed from the same review screen.
- Approval of a set of data must trigger automated notification of all appropriate parties.

Data Quality Control

Data element checks need to be applied at time of data entry, whether entry is direct through the SAFIS form or a bulk load through the file upload interface. In general, *entry-time* checks are limited to ensuring that all values entered are valid in the specific context in which they are entered. *Required data elements* must be entered. Data must be of the correct data type and format. Dates must be reasonable for the given *permit year* and data collection period. *Species and port codes* must exist in the SAFIS lookup tables. Where possible to implement at data entry time, values must be within a valid range.

In general, if a record meets the ACCSP minimum standard, the dealer report should pass any audit or QC/QA process. In order to meet certain federal reporting requirements, some additional elements may be added and/or checked. The following data element checks need to be applied at time of data entry, regardless of entry method:

Dealer and Vessel Information:

These values are established and validated by SAFIS prior to the entry of any landing information. Dealer information is based on login information – the dealer's username and password used to gain access to SAFIS. Vessel information is established through dealer selection of the vessel or fisherman for which to enter a record, based on the SAFIS PERMITS table.

- **Dealer Information**
    - State and/or Federal dealer permit (license) number (Some dealer submissions may be fulfilling state and federal reporting requirements. In this case, both permit numbers must be legitimate and current for the date of purchase. Current for the data of purchase is something that cannot be checked until a later audit process. Given NMFS desire – and current practice – of accepting data even if the permit is not current, data should be accepted anyways, and the audit process should flag it for field staff review.)
    - Dealer name
    - Dealer address
    - For Federal purposes, address should be that of the point of Purchase
    - Address listed per the federal dealer permit?
    - For state purposes, is this address the same?
- **Vessel Data**
    - Valid federal vessel permit number – valid format and exists in the PERMITS table (for federal landings)
    - Valid federal Hull Number (not the manufacturer's hull identifier) that matches the federal permit number for the given data of purchase, where permit number not in (000000, 190998, 390998) unknown. In most cases this will be the state registration or Coast Guard registration number.
- **Landing Information**:

- Valid species code – The code exists in the SAFIS species table. SAFIS should not allow users to enter a species code that is not in the SPECIES table.
- Valid unit of measure, for which appropriate conversion codes exist in the species table. SAFIS should not allow users to enter a unit of measure invalid for the entered species.
- Valid date of purchase – Correct format and valid day, month, year. (no 31st of February, 2200, for example)
- Valid processing Year (> 2001)
- Valid Month and Day
- Valid pounds – At data entry, non-zero and a wide range of values can be enforced. More specific ranges, on a per species and utilization code basis, are better addressed as part of an audit procedure.
- Valid purchase price – At data entry, a wide price range can be enforced. A more specific price range check, given the species, utilization code, and state or port, is better addressed as part of an audit procedure. If a value is entered, that value must be non-zero. The ability to leave price null at initial data entry must be allowed.
- Valid utilization (disposition) code – Non-null and valid. Utilization codes need to be standardized across state and federal partners and the ACCSP disposition codes.
- Valid Market and Grade Catagories, managed to the species level
- Valid Unit of Measure with appropriate conversion to whole and landed weight in poinds
- Valid port code – Non-null and valid for the SAFIS instance (State) . SAFIS should not allow users to enter Ports that are not in the PORT table.
- Unique Record Identifier – SAFIS must assign a unique record identifier upon data entry (record creation). Given the possibility to manual entry and file upload at the same time, some accommodate has to be made to ensure that all records are unique across the SAFIS instance, and perhaps across all SAIFS instances.
- Trip Identifier – though exactly what the trip identifier is going to be is unknown at this time, or, whether it will be that same for NMFS as for state partners, at entry time one can ensure that the value is entered, is non-zero, and has a particular format.

Automated Audit Procedures ("Background" Audits)

The next level of audit is an examination of the data for quality as a complete valid landings record, with respect to all known data elements. This stage of the process checks for a variety of factors that cannot be caught upon data entry, as they are dependent on corresponding data elements. For example, a valid utilization code for a given species, or tighter price range for a given species, utilization code and port can be determined when data is reviewed as a complete landing record.

The minimum post-commit checks that must be included in SAFIS for dealer reports are those currently implemented in the NMFS CODES application. These checks are summarized in the following paragraphs. These checks must be expanded to accommodate the requirements of state partners. The state requirements are not fully known at this writing, and are not included here. It is anticipated once state requirements are known, audit procedures that address both state and federal requirements can be constructed.

Price by Species:

Price should be within 10% of the price range for a given species. The NMFS CODES audit procedure uses the table CFSPPTBL. An equivalent table will need to be constructed for SAFIS, and loaded with values appropriate to each SAFIS instance (each state). Note that CODES employs separate tables for each CODES installation, which allows a great degree of customization in price ranges for a specific location. This degree of customization may not be possible with a single, state-wide SAFIS instance. One option is to expand the species-price audit table to include Port as well. The practicality of this needs to be investigated.

- Price <= 1.1* maximum price from the instance-specific species table
- Price >= 1.1*minimum price from the instance-specific species table

Port of Purchase, Port of Landing

NMFS requires port of purchase; most state partners require port of landing. Both port values must be valid ports given the SAFIS instance, that is, they must be reasonable ports for the particular state. While a simple check against the PORT table can be done at time of entry, for both port values, these two values should be close enough to be realistic.

Trip Identifier

Exactly what the unique trip identifier for NMFS-partner SAFIS will be is not known at this time. It may be a combination of manually entered values, based on a serial number passed from the vessel to the dealer, or vice versa, or a computer-generated value, or a combination. When the trip identifier is determined, an appropriate check to ensure that is indeed unique across the SAFIS instance, and unique across all SAFIS instances, will be required.

NMFS Documentation Number – need the equivalent

The current NMFS documentation number is the equivalent of a transaction number between the dealer and the vessel. There is one documentation number assigned to each species translation between a dealer and vessel. Multiple documentation numbers comprise a single trip, and multiple documentation numbers comprise a purchase session between a dealer and a vessel.

Duplicate Reporting

In an ideal world the unique trip identifier would be truly unique and could be used to prevent the entry of duplicate data. In the meantime, SAFIS must check for potential duplicate records. These checks can be based on dealer permit number, vessel permit number and date, as an absolute duplicate, or for vessel permit number, date and species, as a potential duplicate.

State-Specific Audit Procedures

State reporting requirements are different from federal reporting requirements. NMFS does not currently require dealers to report gear or area, or even body of water fished. Certain states do require such data elements, and may require or desire audit checks to review the validity of reported information. State-specific audit procedures can be developed as need to screen for particular combinations of information. It is anticipated that state-specific audit procedures would output audit log messages that are only sent to state-affiliated parties.

Field Staff Audits

No matter what degree of programmatic examination of data is performed, there is still a need for visual review of data by knowledgeable field staff. Ultimately, this visual review can be targeted, based on the fatal, warning and informational messages produced by programmatic audit routines already executed.

A specialized screen for bulk review and edit of dealer data must be provided. This screen should allow a field agent to:

- Select sets of data for bulk review based on the following criteria:
    - Date range
    - Field staff location or area of responsibility
    - Individual or multiple dealers
    - Port or port(s) of purchase
    - Species
    - Permit category
- "Sign off" or somehow confirm that their audit of the data is complete. In the current process, the audit is complete when the field staff transfers the data to the central repository. As this manual transfer no longer occurs, there must be some mechanism or policy for indicating when an audit is complete. The Sign-off feature should be password protected, and should set a flag in the database that indicates that the NMFS field staff audit of the set of data is complete.
- Edit values and commit the edits. The commit of an edit must trigger notification of the change to all administrative users (state partner administrator, the dealer (?) and other appropriate parties). The Edit process is addressed more completely in the following section.

Suggested Edit Process, Corrections and Agreements

A joint federal and state reporting system necessitates coordination of all changes to data between partners. While the system will manage replication between partner database systems, there must be a logical, agreed upon process for actually making edits once the need for a change has been identified. Once agreed to, the process may be automated using the SAFIS system to provide user alters, or e-mails.

Primary Administrative User (Responsible Party)

There should be a primary administrative user, for each SAFIS system. Either of these users many formally initiate a data change.

When either a federal or state user detects the need for a change, that user must notify the primary administrative user. The primary user will then notify the counterpart partner primary user. An example might be that a NMFS port agent notices an error in data from the Rhode Island data system. This port agent would coordinate with the RI administrator (John Lake). When the need for the change is agreed upon, the initial user can make the edit. Upon commit of the edit transaction, all appropriate parties will be notified by email (or other agreed form of communication) of the edit, and an automated process will propagate the change as necessary.

Initially, the primary federal and state users will do the exchange of the need for an edit, by phone or email. Eventually, this exchange could be accomplished through an online, integrated request/approval system, whereby the request for change could be initiated by any number of approved users, and the approval of both primary agents would be required before a change could be committed.

Confirmations and Notifications

Each phase of the audit process should notify all appropriate persons – dealer, federal and state staff, of the result of the audit.

Informational Error Message

For at-entry checks, an informative message should be displayed to the user that reports the error and informs the user of how to correct it. Online help should be available to provide further assistance to users where necessary.

Audit Log Table and Report

Procedural audit checks should output a record to an audit log table. The results of an automated audit run - all records written to the audit log table on that run - should be written to an audit report. This report should be emailed to all appropriate parties, or posted to a common web page for appropriate persons to view. The contents of the audit log table could be purged upon correction of the item that caused the audit log, or

preserved indefinitely to be periodically purged by a system administrator, or preserved and periodically archived as a record of the quality improvement process.
The audit table will need to include a column that identifies the record as being of federal, state or both party interest, so that audit reports can be constructed specifically for federal or state recipients. The audit reports may in fact need to be posted to two sites, one for federal purposes and one for state purposes.

Visible Audit Results

Another option is for field staff to have the capability of running audit procedures on a selected set of data, and have the audit procedure highlight problem records as part of the process. This on-demand audit procedure run allows field staff to execute the audit procedures on a focused set of data, and to confirm data quality upon an edit change.