ISSN: 1995 – 4875

CRFM Special Publication, No. 25

GLOBAL ADMINISTRATOR MANUAL
Fisheries Early Warning and Emergency Response (FEWER)

Source: Winsbert Harry, St. Vincent Waters (2017)

CRFM Secretariat
2018

GLOBAL ADMINISTRATOR MANUAL: FISHERIES EARLY WARNING AND EMERGENCY RESPONSE (FEWER)

Prepared by:
ICT4Fisheries Consortium

under contract through the Marine sub-component of the Investment Plan for the Caribbean Regional Track of the Pilot Program for Climate Resilience, co-implemented by the Caribbean Regional Fisheries Mechanism (CRFM).

CRFM Secretariat
Belize, 2018

GLOBAL ADMINISTRATOR MANUAL: FISHERIES EARLY WARNING AND EMERGENCY RESPONSE (FEWER)

Publication of deliverables under Investment Plan for the Caribbean Regional Track of the Pilot Program for Climate Resilience (PPCR) [TC No.: ATN/SX-14969-RG]

This publication was generated under the Investment Plan for the Caribbean Regional Track of the Pilot Program for Climate Resilience (PPCR). This publication was made possible through the leadership of University of the West Indies through the Mona Office of Research and Innovation (MORI) with technical support from co-implementing partner, the Caribbean Regional Fisheries Mechanism (CRFM) and funding support from the Climate Investment Funds through the Inter-American Development Bank.

This work is published under the responsibility of MORI for the Caribbean Investment Plan for the PPCR. The opinions expressed and arguments employed herein do not necessarily reflect the official views of the member countries of the PPCR, its lead agency, the Climate Investment Funds, or the Inter-American Development Bank (IDB).

Please cite this publication as:

CRFM. 2018. User Manual: Fisheries Early Warning and Emergency Response (FEWER). *CRFM Special Publication*, No. **25**. 113pp.

ISSN: 1995-4875
ISBN: 978-976-8257-74-1

Links to the publications may be found on line at: [www.crfm.int]

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Published by the Caribbean Regional Fisheries Mechanism Secretariat,
Belize and St. Vincent and the Grenadines.

Acknowledgements

FEWER was co-designed by many who gave of their considerable time and extensive knowledge, skills and experience. Particular thanks are due to:

- the FEWER liaisons in Dominica (Norman Norris, Zethra Baron and Kirby Birmingham); Grenada (Francis Calliste and Luis Acosta); Saint Lucia (Hardin Pierre, Yvonne Edwin and Alva Lynch) and St. Vincent and the Grenadines (Lorenzo George, Shamal Connell and Winsbert Harry);
- the very many organisational representatives and fishers, too numerous to mention, who provided critical inputs into the requirements specification of FEWER during face to face consultations in the 4 FEWER countries;
- active FEWER fisher co-designers in Dominica (Earl George, Huron Vidal, Philson Wallace, Dwight Scotland “Fish Money I living on” and Hudson Toussaint “Hotone”); Grenada (Lyndon Marrast, Aldwyn Ferguson, Antoine Arrendel, Desmond Gill, Dexter Miller, Dwayne Lewis, Kasha Walker, Royan Isaac “I'm just blessed” and Luis Acosta “If thous can't believe”); Saint Lucia (Joseph Shepherd, Darren Leon, Horace Walters, Michael Desir, Devon Stephen and Mac Clement St Rose “What I love best”); St. Vincent and the Grenadines (Peter Regis (Union Island), Seon Lucas, Reuben Bradshaw, Roderick Telemac, Winston Hazelwood “Teacher”) and other jurisdictions including St. Kitts and Nevis (Darwin Francis “Busta”);
- representatives of local fisheries authorities, disaster management agencies, meteorological services, fisherfolk organisations and the Red Cross in FEWER countries, who regularly engaged on the co-design of the administrative aspects of the application. Special thanks to Billy Jeffers, Yvonne Edwin, Joan McDonald, Hardin Pierre, Terry Charles, Lionel Ellis, Samantha Dickson, Kemron Dufont, Jerry Lewis, Raphael Paul, Claudine Roberts;
- the Caribbean Network of Fisherfolk Organisations (CNFO) for liaison support within the organisation. Particular thanks to Nadine Nembhard for regular and comprehensive participation in the entire co-design life cycle;
- Dr. Susan Singh-Renton who provided ongoing oversight and valuable feedback throughout all stages of FEWER design, development and implementation.

Thanks are also due to the International Development Research Centre (IDRC) and the Technical Centre for Agricultural and Rural Cooperation ACP-EU (CTA) for facilitating the development and extension of the mFisheries framework on which FEWER was built. This framework underpins FEWER’s rich portfolio of instrumental, informational and communications functions, differentiated by class of user. It enables the implementation and interoperability of additional fisher-focused modules on a common software architecture.

Foreword

This document was produced under the Marine sub-component of Component 4, Applied Adaptation Initiatives, of the Caribbean Regional Track of the Pilot Programme for Climate Resilience (PPCR).

As a programme of the Climate Investment Funds (CIF), PPCR helps developing countries integrate climate resilience into development planning and investment. The PPCR comprises 28 national programmes and two regional tracks (the Caribbean and the Pacific) across the developing world. The CIF, through the Inter-American Development Bank (IDB), has provided grant funding to implement the Caribbean Regional Track of the PPCR. The University of the West Indies, Mona, through its Mona Office for Research and Innovation (MORI) is executing the PPCR regional programme. The Caribbean Regional Fisheries Mechanism (CRFM) is co-implementing the Marine sub-component of PPCR Component 4 to reduce the impact of climate change-related risks on the fisheries industry in the Caribbean.

The Marine sub-component of Component 4 seeks to reduce the risks to fishers associated with climate change and variability. Through one of the initiatives in this sub-component, a consultant was contracted to develop an early warning and emergency response system (EWERS) for fishers in Grenada, Dominica, Saint Lucia and St. Vincent and the Grenadines; and to provide associated training. The specific deliverables of the consultancy were:

1. Inception Report
2. Reports of stakeholder consultations with proposals for each country
3. Memoranda of Understanding among stakeholder groups for each country
4. Prototype EWERS for testing
5. Draft user and administrator manuals for EWERS
6. Report of training workshops and associated materials including impact assessment tool
7. Final EWERS, including e-services, installed and tested
8. Final user and administrator manuals for EWERS.

The EWERS has come to be referred to as Fisheries Early Warning and Emergency Response (FEWER). In its capacity as a co-implementing agency for the Marine sub-component of PPCR Component 4, the CRFM was responsible for technical oversight of FEWER's development by the ICT4Fisheries Consortium.

The general requirements for FEWER were specified through face to face consultations with fishers and a rich spread of other stakeholders in Grenada, Dominica, Saint Lucia and St. Vincent and the Grenadines during the months of March and April 2017. Co-design teams of fishers, as well as non-fisher stakeholders, were subsequently constituted, and regular meetings held remotely with them and the development team, the ICT4Fisheries Consortium. Co-design meetings with fishers were conducted through skype and with non-fishers through Zoom. A FEWER Fishers' WhatsApp group was used for asynchronous communications with and among fishers.

Acronyms and Abbreviations

API	Application Programming Interface
CAP	Common Alerting Protocol
CDEMA	Caribbean Disaster Emergency Management Agency
CIF	Climate Investment Funds
CNFO	Caribbean Network of Fisherfolk Organizations
CRFM	Caribbean Regional Fisheries Mechanism
CTA	Technical Centre for Agricultural and Rural Cooperation
DM	Disaster Management
DMA	Disaster Management Agency
DRM	Disaster Risk Management
EWERS	Early Warning and Emergency Response System
FEWER	Fisheries Early Warning and Emergency Response
HDD	Hard Disks Drives
HTTP	Hyper Text Transfer Protocol
ICT	Information Communication Technology
IDB	Inter-American Development Bank
IDRC	International Development Research Centre
IDS	Intrusion detection system
ISO	International Organization for Standardization
JS	Java Script
JSON	Java Script Object Notation
LEK	Local Ecological Knowledge
MORI	Mona Office for Research and Innovation
NAS	Network Attached Storage
NOAA	National Oceanic and Atmospheric Administration
NPM	Node Package Manager
OOP	Object Oriented Programming
OS	Operating System
PPCR	Pilot Programme for Climate Resilience
RAID	Redundant Array of Independent Disks
RAM	Random Access Memory
RDBMS	Relational Database Management System
REST	Representational State Transfer
SAME	Specific Area Message Encoding
SMS	Short Message Service
SSL	Secure Sockets Layer
UNISDR	United Nations Office for Disaster Risk Reduction
URL	Uniform Resource Locator
UWI	University of the West Indies
WEA	Wireless Emergency Alerts
WSGI	Web Server Gateway Interface

Contents

1. Background

1.1 Small-scale fishers' vulnerabilities to hazards

The US Bureau of Labour Statistics (2017) [1] ranks fishing as the job with the second highest rate of work-related deaths in America, based on 2015 figures. Forbes (2017)[2] ranks fishers and fishing workers as those with the most dangerous jobs, attributing the ranking to extreme weather, heavy equipment and drowning. Though harsh winter weather is not a factor, fishing methods differ, and there are few related statistics for the Caribbean, small-scale fishers in the region are particularly vulnerable on account of the modest safety provisions in their vessels and variable weather systems with seasonal hurricanes.

1.2 National Disaster Risk Management (DRM) framework

Reduction of risk to fishers is best undertaken within a national framework for disaster risk management (DRM). Such frameworks make provisions for the four phases of the disaster management (DM) cycle: mitigation, preparedness, response and recovery. They include policies, legislation, plans for preparedness and management, early warning systems, public awareness and capacity building as well as established organisational arrangements and procedures for all segments of society. National DRM frameworks are supported by sector- and community-specific plans which align with an integrated system of all-hazards mitigation, preparedness, response and recovery for all citizens.

1.3 Multi-agent roles in disaster management for fishers

National fisheries, disaster management and meteorological agencies play lead and ancillary roles in support of small-scale fishers within the national DRM framework. The following sections capture key aspects of these roles, drawing heavily on UNISDR (2006)'s Checklist for Developing Early Warning Systems[3].

1.3.1 Role of fishers

Fishers should be involved in all aspects of the establishment and operation of early warning systems that are targeted to benefit them. They are to be aware of the hazards and potential impacts to which they are exposed and be able to take actions to minimise the threat of loss or damage by reducing sensitivity and increasing adaptive capacity. They are also to be knowledgeable, prepared and ready to react to warnings and emergency situations.

1.3.2 Role of fisheries authorities

As a division of government, fisheries authorities are required to be aware of national policies and frameworks for early warning. They are responsible for ensuring that these adequately serve the special needs of small-scale fishers. They should be actively involved in the design and maintenance of early warning systems by their considerable knowledge of the hazards to which fishers are exposed, of the communications capabilities of fishers and of message formulation that would be most meaningful to fishers.

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[1] US Bureau of Labour Statistics (2017). Available at https://blogs.bls.gov/blog/2017/06/27/most-dangerous-jobs/ . Last accessed 30 November 2017

[2] Forbes (2017). Available at https://www.forbes.com/pictures/efkk45kifl/americas-10-deadliest-jobs-2/#76d7c59d1670. Last accessed 30 November 2017

[3] UNISDR (2006). Developing Early Warning Systems: A Checklist. Third International Conference on Early Warning. *From concept to action*. 27-29 March 2006. Bonn, Germany. Available at https://www.unisdr.org/2006/ppew/info-resources/ewc3/checklist/English.pdf. Last accessed 30 November 2017.

Fisheries authorities must understand advisory information received and be able to advise, instruct and engage fishers to increase their safety and reduce loss and damage before and during emergency situations. They are an important intermediary between fishers and disaster management agencies, as well as between fishers and national meteorological ("Met") services and must maintain corresponding lines of communication.

It is important that fisheries authorities track the use and interpretation of early warning messages by fishers over time and accordingly direct revisions to message formats and dissemination processes. Fisheries authorities are also responsible for providing support to fisherfolk organisations to ensure that operational capabilities are built.

1.3.3 Role of fisherfolk organisations

Fisherfolk organisations play a critical role in effective early warning and emergency response for fisherfolk. They have regular access to fishers and considerable knowledge of the hazards to which they are exposed. Fisherfolk organisations can raise and sustain awareness about early warning and emergency response systems and procedures. They should assist fisheries authorities to implement such systems and procedures; and assist fisherfolk in preparing for and responding to natural disasters. They also play an important advocacy role to help ensure that early warning and emergency response for fishers remain on the national development agenda.

1.3.4 Role of meteorological services

National meteorological (Met) services have the expertise to analyse the risks to seafarers from natural hazards, and to translate the findings into messages that fishers can understand. The Met services are also able to specify the measurement parameters and warning thresholds associated with each relevant hazard. They, therefore, provide important inputs into the design and operation of early warning systems for seafarers, including the dissemination of clearly recognisable and consistent warnings that adhere to international standards and protocols.

1.3.5 Role of disaster management agencies

National disaster management agencies (DMAs) are responsible for coordinating agencies that manage all phases of the disaster management cycle. They specify the processes, roles, responsibilities and protocols for generating and issuing authoritative warnings. These specifications cover the warning dissemination chain and channels for technical warning services. DMAs must ensure consistent warning dissemination and communication systems are used for all hazards, and that alerts and messages are targeted to those at risk only. They play a critical role in the design and operation of early warning systems for fishers to ensure compliance with the protocols and rules of conduct for national early warning. DMAs also provide post-disaster relief and rehabilitation services; and play a very important role in the provision of learning resources and training to assist fishers to prepare for, and manage themselves during and after, natural disasters.

1.4 FEWER

Fisheries Early Warning and **Emergency Response** (FEWER) is a set of tools that link small-scale fishers with each other and with agencies that play critical roles in the overall DRM framework. These links are effected through a system of information and communications facilities. The tools comprise a mobile application and web-based administrators' dashboard. FEWER is built on the mFisheries framework which provides services common to a range of applications that support various aspects of fishers' livelihoods. FEWER is one of several tools that reduce fishers' risks. No single tool can meet all needs.

1.4.1 Aims

FEWER aims to reduce fishers' risks from natural hazards associated with weather (short term) and climate (long-term) through improved information and communications regarding issues of particular concern to fisheries, and to do so within the national DRM framework.

1.4.2 Strategy

The overarching strategy to reduce weather- and climate-related risks for fishers is to build their **resilience**. FEWER is the information and communications technology (ICT) component of this strategy. Other key aspects of the strategy ensure fishers' understanding of risks and mechanisms for mitigation and response, enable context-appropriate reinforcement of these mechanisms, build relevant skills, and provide operational support. They also crucially call for the incorporation of fisher engagement and support into the planning and regular operations of a number of agencies, primarily fisheries authorities, fisherfolk organisations, Met services and DMAs.

1.4.3 Objectives

The objectives of FEWER are to provide specific risk-reducing capabilities that small-scale fishers can access through the mobile phone, and key agencies can manage through a web-based administrators' dashboard. These capabilities together span all phases of the disaster management cycle with particular emphasis on the four crosscutting elements of early warning.

1.4.4 Modules

For most effect, the communication between fishers and key agencies is sustained through all phases of the disaster management cycle. For the mitigation phase, an acute awareness of the marine environment and any noticeable changes is key, as is the practice of letting others know of plans to set out before trips. For the preparedness phase, information about the weather and sea conditions, how to plan around these and what to do if they are unavoidable, are key. For the period during a disaster, emergency contacts and knowledge of what to do in the event of an emergency is vital. Also, during and immediately following a disaster, identification of missing persons is critical. In the latter period of the response phase and the early stages of recovery, the reporting of damage is an essential input for subsequent planning exercises.

FEWER provides support for all four DM phases through eight modules: Local Ecological Knowledge (LEK), Messaging, Weather, Alerts, Emergency Contacts, Emergency Procedures, Damage Reporting and Missing Persons as shown in Figure 1.1.

DM Phase	FEWER Module		Fishers …
Mitigation		**LEK**	• **record** anything in the marine environment that should be noted to reduce fishers' risks
		**Messaging**	• keep **in touch** with other fishers to be aware if, where and when anyone goes missing
Preparedness		**Weather**	• **receive** and **share** information from local and international sources with indicators when things look risky • **receive** from and **send** alerts to Fisheries, Met and Disaster Offices, and other fishers
		**Alerts**	

Response		**Emergency Contacts** **Emergency Procedures**	• **access** up to date Emergency Contacts directly • **receive** trusted guidance on procedures to follow in emergency situations
Recovery		**Damage Reporting** **Missing Persons**	• **share** reports based on property damage with the Authorities • **broadcast** information to help in the recovery of missing fishers.

Figure 1.1 FEWER Modules and Key Time to Use

Together, these modules cover the UNISDR early warning checklist elements: risk knowledge, monitoring and warning service, dissemination and communication, and response capability.

1.4.5 Administration

All FEWER modules except Messaging require either configuration and updating by local agencies; or interaction between these agencies and FEWER fishers who use the mobile app. Such administrative tasks are assigned to different types of FEWER administrators ("admins") with access privileges set accordingly. The Messaging module does not require interaction between FEWER admins and fishers so is not treated explicitly in the Administrator Manual.

1.5 Intended audience for this manual

The target audience for this manual are representatives of Caribbean authorities in fisheries, hydrometeorology and disaster management who serve different administrator roles, as explained in Section 2; as well as the Caribbean Network of Fisherfolk Organisations, who will all take on the role of FEWER regional reviewers. The primary audience is the regional agency with responsibility for FEWER global administration. Any other information technology specialists who assist or support the technical aspects of FEWER installation and regional administration are also target readers.

A subset of this document is available as the local administrator manual. The audience for that document comprises representatives of national fisheries authorities, fisherfolk organisations, Met services and DMAs, who will take on the role of FEWER **country** and **agency administrators** in Grenada, Dominica, Saint Lucia and St. Vincent and the Grenadines. As the national body with responsibility for search and rescue at sea, the Coast Guard in FEWER countries are also target readers for the general administrator manual.

1.6 Purpose and arrangement of this manual

The purpose of this manual is to:

1. Enable FEWER global administrators to:
    i. understand the role of FEWER in the reduction of climate-related risk to small-scale fishers;
    ii. understand the role of the host agency in the system of FEWER agencies;
    iii. distinguish between FEWER country, agency and global administrator roles;
    iv. be aware of the scope of country and agency admin's tasks;
    v. conduct all tasks required of the global admin's role.
2. Provide regional reviewers with a reference document on the functions and operations of FEWER.

Section 1 Background addresses aspects 1(i) and 1(ii) of the document's purpose (above). The following sections address aspects 1(iii), 1(iv) and 1(v) of the document's purpose: Section 2 outlines the scope and role of the FEWER country administrator and that of the FEWER agency administrator. Section 3 describes the administrators' dashboard through which all FEWER administrators manage the application features used by fishers. Sections 4 and 5 walk through a representative selection of tasks performed by FEWER country and agency administrators by module and by country respectively. Sections 6 – 9 are the sole concern of the global administrator. Section 6 presents the procedures for installing and configuring the overall FEWER solution while Section 7 presents testing procedures. Section 8 treats with application deployment and Section 9 with troubleshooting. The manual for the weather module's extractor feature as well as the specifications for software and equipment are additionally provided in the Appendix.

The roles which may execute each task are identified as C.A. for country administrator, A.A for agency administrator, T.A for country-level technical administrators, C.G for the Coast Guard (marine police) and R.R for regional reviewers. Global admins can execute all administrative tasks, so their role is not tagged with any task in the manual.

In preference to references at the end, footnotes are used for convenient access to resources.

2. FEWER Administrators

The administration of fisher early warning and emergency response communication falls to the fisheries authorities as the FEWER **country administrators (CA)**; and the disaster management agencies, Met services and fisherfolk organisations as FEWER **agency administrators (AA)**. The overarching coordination of FEWER is the responsibility of the CRFM as the regional authority for fisheries. The CRFM is joined by regional authorities for hydrometeorology and disaster management, and the Caribbean Network of Fisherfolk Organisations, as FEWER **regional reviewers (RR)**. These administrators view all information accessible to country and agency administrators, and can draw on this information to create reports, but do not otherwise play a role in the day to day support of FEWER operations at the national level. As a software application, the technical aspects of FEWER are managed at the national level by **technical administrators (TA)** and regionally by the **global administrator (GA)**. Technical administrators are local administrators that are technical representatives from either the I.T. unit of the fisheries-related ministry or the national ministry responsible for ICT. Global administrators are technical representatives sourced from the regional agency with responsibility for hosting and managing FEWER. Each class of administrator is defined by the set of allowable tasks. The relative scope of tasks is shown in Figure 2.1.

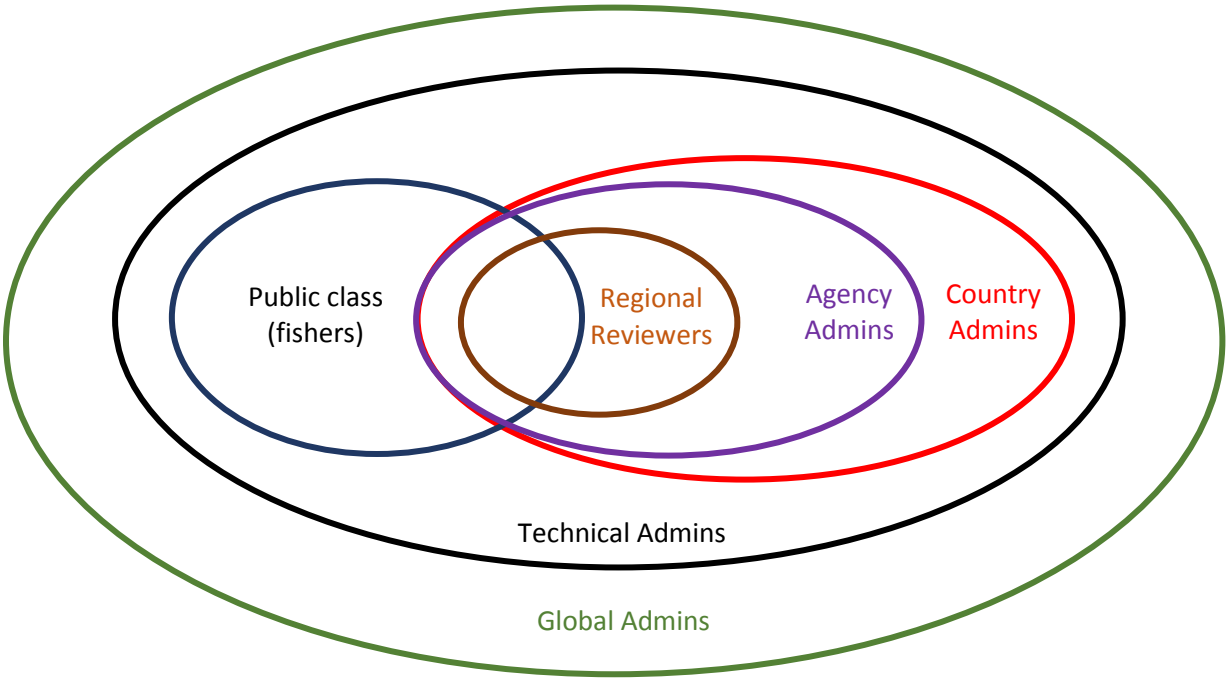


Figure 2.1 Relative scope of tasks for FEWER Users

2.1 FEWER country administrator

FEWER country administrators, referred to in this manual by a red "C.A", are responsible for the configuration, management and administration of the national FEWER installation with country-level moderation privileges. They perform their role through FEWER's web-based administrators' dashboard. Once familiarised with their role, their expected average load for such activities is one hour per week. It is expected that country-level FEWER administration will rest with the fisheries authorities.

They perform tasks such as the following:

I. General:
    a) Create Users
        a) Create Agency Administrator
        b) Create Marine Unit/Coast Guard User

II. Alerts:
    a) Manage Alert Sources
        a) Add new CAP alert source

    b) Manage community alert groups
        a) Create Alert Group
        b) View Alert Groups
        c) Edit Alert Group
        d) Delete Alert Group
        e) View Alert Group members

    c) Manage community alerts & CAP alerts
        a) View List of community alerts & CAP alerts received
        b) View details of community alert & CAP alert
        c) Verify community alert
        d) Create community alert & CAP alert
        e) Distinguish FEWER from External CAP alerts
        f) Cancel FEWER CAP alerts
        g) Update community alert & CAP alert
        h) View alert delivery reports

III. Damage Reporting:
    a) Manage Public Damage Reporting
        a) View damage reporting categories
        b) Create damage reporting category
        c) View damage reports
        d) Create damage report
        e) Update damage report
        f) Delete damage report
        g) Export damage reports

IV. Emergency Contacts:
    a) Manage Emergency Contacts
        a) View a list of emergency contacts
        b) Create an emergency contact
        c) Add additional details for an emergency contact
        d) View additional details
        e) Update an emergency contact
        f) Delete an emergency contact
        g) Export emergency contacts

V. Emergency Procedures:
    a) Manage Emergency Procedures
        a) View emergency procedures
        b) Upload emergency procedures

c) Update emergency procedures

VI. Weather:
   a) Manage Weather Data Sources
      a) Create a new weather source
      b) Edit weather source
      c) Add weather parameter thresholds
      d) Delete weather source
      e) Upload extractor file
      f) Manually update weather information from a source
      g) View weather source details
      h) View weather source readings
      i) View weather sources from another country

VII. Missing Persons:
   a) Manage Missing Persons
      a) View Missing Persons
      b) Remove Missing Person report
      c) Create a Missing Person report
      d) Mark a person as found
      e) Export Missing Person reports

VIII. Local Ecological Knowledge (LEK):
   a) Manage Public LEK Reporting
      a) View LEK categories
      b) Create LEK categories
      c) View LEK reports
      d) Create LEK reports
      e) Update LEK reports
      f) Delete LEK reports
      g) Export LEK reports

FEWER country administrator: description
- *An authoritative source on fisheries resource management in his/her country*
- *Able to provide information on sector-specific climate change and disaster risks*
- *Supervises fisheries extension officers*

FEWER country administrator: requisites
- *Regular access to, and proficiency with, web & productivity software tools*
- *Access to a smartphone and familiarity with web and social media applications*
- *Experience with extension services & training*

2.2 FEWER agency administrator

FEWER agency administrators, referred to in this manual by a red "A.A", provide key inputs into the application design and configuration; and provide direct support for fishers through different vantage points: (i) fisheries (ii) hydrometeorology and (iii) disaster management. There are generally, therefore, several FEWER agency administrators in each country.

FEWER agency administrators are responsible for managing, disseminating and moderating communications relating to early warning and emergency response. They do this through FEWER's web-based administrators' dashboard. Once familiarised with their role, their expected average load for such activities is one hour per week. FEWER agency administrators perform tasks such as the following:

Tasks	Agency Administrator Categories
I. Alerts	
1. Manage community alert groups	Fisher Organisations
a) Create Alert Group	Fisher Organisations
b) View Alert Groups	Fisher Organisations
c) Edit Alert Group	Fisher Organisations
d) Delete Alert Group	Fisher Organisations
e) View Alert Group members	Fisher Organisations
2. Manage community alerts & CAP alerts	
a) View List of community alerts & CAP alerts received	All
b) View details of community alert & CAP alert	All
c) Verify community alert	Disaster Management Authority
d) Create community alert & CAP Alert	Disaster Management Authority
e) Distinguish FEWER CAP Alerts from External CAP Alerts	Disaster Management Authority
f) Cancel FEWER CAP alerts	Disaster Management Authority
g) Update community alert & CAP alert	Disaster Management Authority
h) View alert delivery reports	Disaster Management Authority
II. Damage Reporting	
1. Manage Public Damage Reports	
a) View damage reports	All
b) Create damage report	Fisher Organisations; Disaster Management Authority
c) Update damage report	Fisher Organisations; Disaster Management Authority
d) Export damage reports	All
III. Emergency Contacts	
1. Access Emergency Contacts	
a) View a list of emergency contacts	All
b) View additional details	All
c) View all contacts from another country	All
d) Export emergency contacts	All
IV. Weather	
1. Manage Weather Data Sources	

Tasks	Agency Administrator Categories
a) Create a new weather source	Meteorological Services
b) Edit weather source	Meteorological Services
c) Add weather parameter thresholds	Meteorological Services
d) Delete weather source	Meteorological Services
e) Upload extractor file	Meteorological Services
f) Manually update weather information from a source	Meteorological Services
g) View weather sources from their country	All
h) View weather source details	All
i) View weather source readings	All
j) View weather sources from another country	All
V. Missing Persons	
1. Manage Missing Persons	
a) View Missing Persons	All
b) Create a Missing Person report	All
c) Remove a Missing Person report	Fisher Organisations; Disaster Management Authority
d) Mark a person as found	Fisher Organisations; Disaster Management Authority
e) Export Missing Person reports	All
VI. Local Ecological Knowledge	
1. Manage Public LEK Reporting	
a) View LEK Categories	All
b) View LEK reports	All
c) Create LEK reports	Fisher Organisations; Disaster Management Authority
d) Update LEK reports	Fisher Organisations; Disaster Management Authority
e) Export LEK reports	All
VII. Emergency Procedures	
1. Manage Emergency Procedures	
a) View emergency procedures	All

FEWER agency administrators: description

- *Responsible for managing, disseminating or moderating information and communications related to early warning and emergency response in fisheries organisations, disaster management agencies or meteorological services*
- *Currently in a role within a fisheries organisation, meteorological services or disaster management authority consistent with the activities required of the relevant FEWER Administrator tasks (as itemized above)*

FEWER agency administrators: requisites

- *Proficiency with web and productivity software tools*
- *Access to, or ownership of a mobile phone (feature), as well as familiarity with SMS text messaging*
- *Experience with activities required of the relevant FEWER Administrator tasks within the fisheries organisation, meteorological services or disaster management authority, as appropriate*

2.3 FEWER administrator scope: country vs agency

FEWER country administrators can execute the same tasks as agency administrators and more. Fishers, who have public class access privileges, also execute some of these tasks using the FEWER mobile app.

2.4 Other FEWER administrators

The technical administrator (T.A) has all the access privileges of the country administrator. While the country administrator manages fisheries-related use of the system, the technical administrator ensures that all the software-related operations are functional for the respective countries. They are additionally responsible for creating, updating and uploading data extractors for the Weather module. The coast guard (C.G) is a specialised version of the agency administrator (A.A). The operations are restricted and focused specifically on the tasks related to the coast guard of the respective territories. They are responsible for monitoring the daily tracks of users as well as viewing records for the Alerts, Missing Persons and Weather modules. The regional reviewers are agencies that can access information that fishers identify as public. These agencies have a strategic priority for their support of FEWER and are a critical component for sustaining of FEWER. The regional reviewers (R.R) cannot modify any of the information generated in each territory but can produce a variety of reports that provide an understanding of FEWER's usage, and the impact of natural hazards in the Caribbean. FEWER requires technical support for regional hosting and management. These operations are the responsibility of the global administrators. The global administrators ensure that the hosting infrastructure and technical components of the FEWER system are correctly configured for the countries' use. They can execute all FEWER tasks.

3. The FEWER Administrators' Dashboard

The FEWER administrators' dashboard is a web-based application that provides services to both administrators and public users. The dashboard provides controls and operations for administrators to manage and submit information to ensure the smooth operation of the FEWER services in their respective countries.

3.1 The Browser

The FEWER administrators' dashboard works in modern web browsers on both the desktop and mobile devices. The following browsers are tested and supported:

Desktop

1. Chrome (v 62)
2. Firefox (v 57)
3. Internet Explorer 11
4. Microsoft Edge (v16)
5. Safari (v 11+)

Mobile

1. Chrome (v 62)
2. Firefox (v 57)
3. Webkit (v 533)
4. Safari mobile

3.2 Accessing the administrators' dashboard

To access the FEWER administrators' dashboard, navigate to https://fewer.cirp.org.tt. The browser will display the FEWER website with its drop-down menu. It will also display a log-in screen as shown in Figure 3.1.

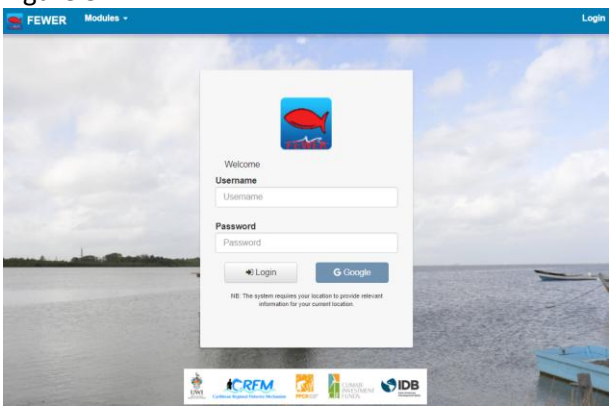


Figure 3.1 FEWER login screen

All administrators must log-in. Credentials (username and password) are provided as follows:

- Country administrator: configured on FEWER commissioning, with edit privileges assigned to the approved country administrator
- Agency administrator: created, assigned and managed by the country administrator

As regional FEWER Coordinator, the CRFM will specify the points of contact for the provision of access credentials. They may be contacted via secretariat@crfm.int, subject "FEWER".

3.3 How do I access the FEWER administrative features?

After logging into the application with country administrator's credentials the country administrator's dashboard, shown in Figure 3.2, is displayed. The administrators menu is visible at the top of the screen. To access FEWER-specific management functions, hover over the "modules" menu option. The drop-down menu with FEWER modules is displayed. Click on any menu item to access the relevant module controls.

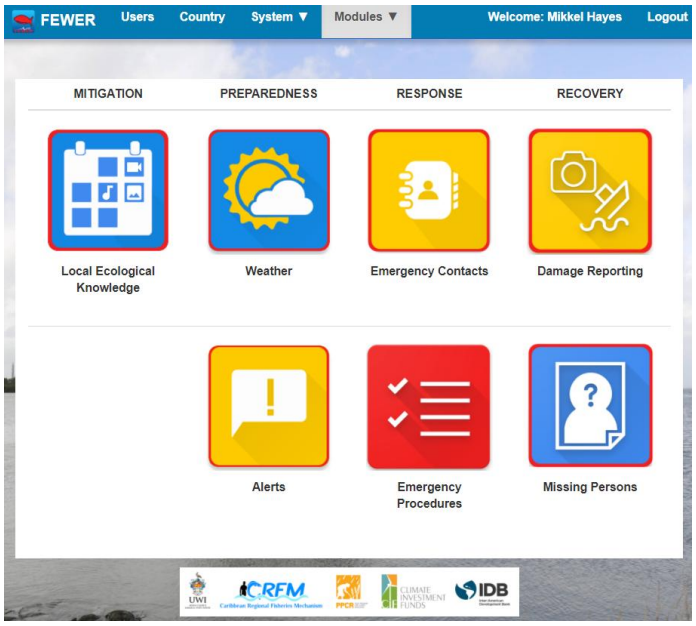


Figure 3.2 FEWER country administration features via the menu

After logging into the application with the agency administrator's credentials the administrator's dashboard illustrated in Figure 3.3 is shown. Similarly, the FEWER-specific management features can be accessed either using the respective module icons or hovering over the "modules" menu option.

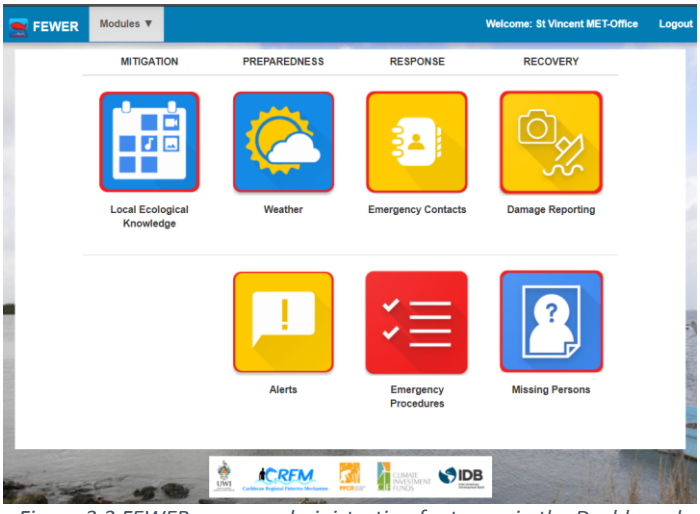


Figure 3.3 FEWER agency administration features via the Dashboard

Regional reviewers will access the same dashboard as agency administrators illustrated in Figure 3.3. However, regional reviewers will have read-only access for FEWER modules. This implies that all of the create, update and delete operations will be unavailable for regional reviewers.

4. Administrative Tasks by Module

4.1 Alerts

4.1.1 How do I access the Alerts Module? (A.A, C.A, C.G, T.A, R.R)

After logging in to the FEWER administrators' dashboard using the credentials provided, hover over the FEWER option in the menu and click the Alerts option from the list as shown in Figure 4.1.

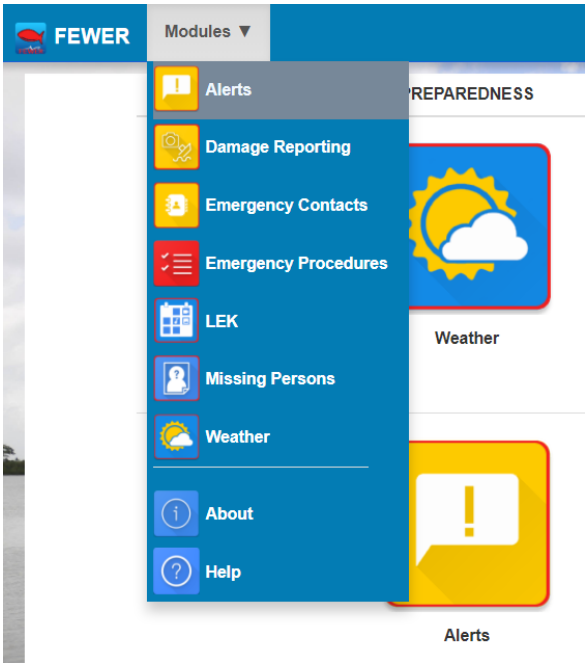


Figure 4.1 Accessing the Alerts Module from the FEWER main menu

When the Alert module is selected, the Alerts dashboard is displayed. It is organised by CAP and community alerts, each with the controls to manage the respective alert type, as in Figure 4.2.

4.1.2 What is a CAP alert?

CAP stands for Common Alerting Protocol. It is an international standard that specifies a common message format for public alerts and warnings issued over different communications systems including broadcast television, free to air radio, cell phones etc. It is backwards-compatible with NOAA Weather Radio's Specific Area Message Encoding (SAME) and Wireless Emergency Alerts (WEA).

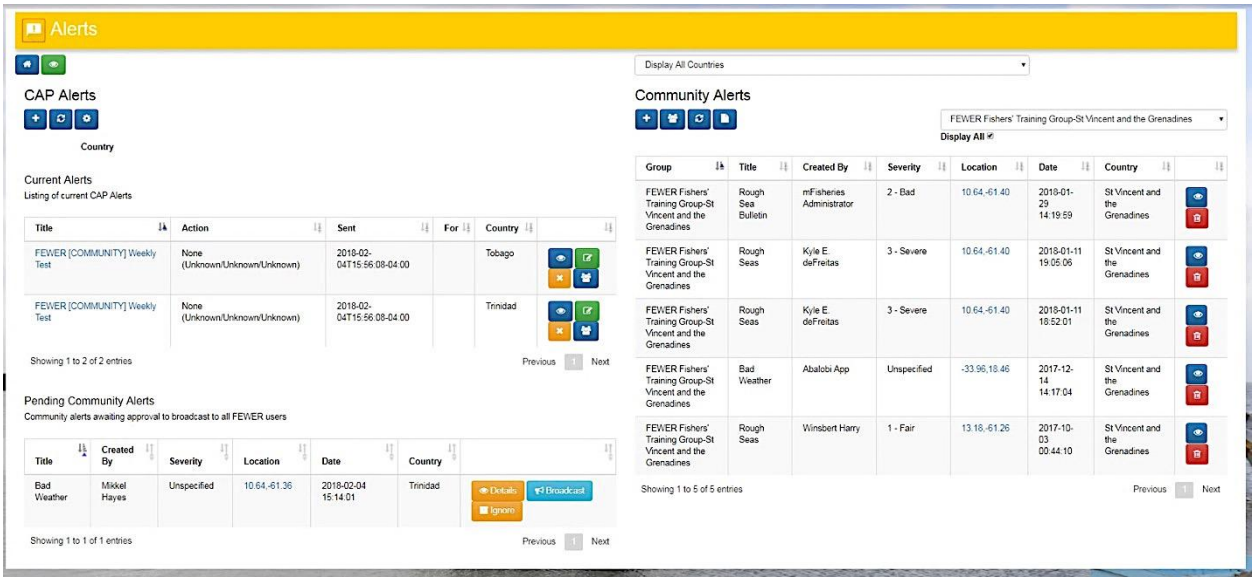


Figure 4.2 Alerts controls and listings

4.1.3 What is the difference between a CAP and a community-based alert?

FEWER facilitates both Common Alerting Protocol (CAP) and community alerts. Table 4.1 summarises the key differences.

Table 4.1 Key distinctions between FEWER CAP and community-based alerts

	Common Alerting Protocol (CAP)	**Community Alert**
Scope	Multi-device	Mobile only
	All FEWER users	Community-wide
Protocol	International	FEWER specific
Source	Administrator	Public User

4.1.4 How do I view CAP alerts? (A.A, C.A, T.A, R.R)

CAP alerts are displayed in the left-hand area of the Alerts dashboard. Current alerts display alerts approved for dispatch to all FEWER users. The "Pending Community Alerts" section display alerts that originate from fishers who wish to broadcast beyond their community. These broadcasts must be approved by the administrator. Each alert entry comprises the title of the alert, the action to be taken, the date issued and the set of administrator controls, as shown in Figure 4.3.

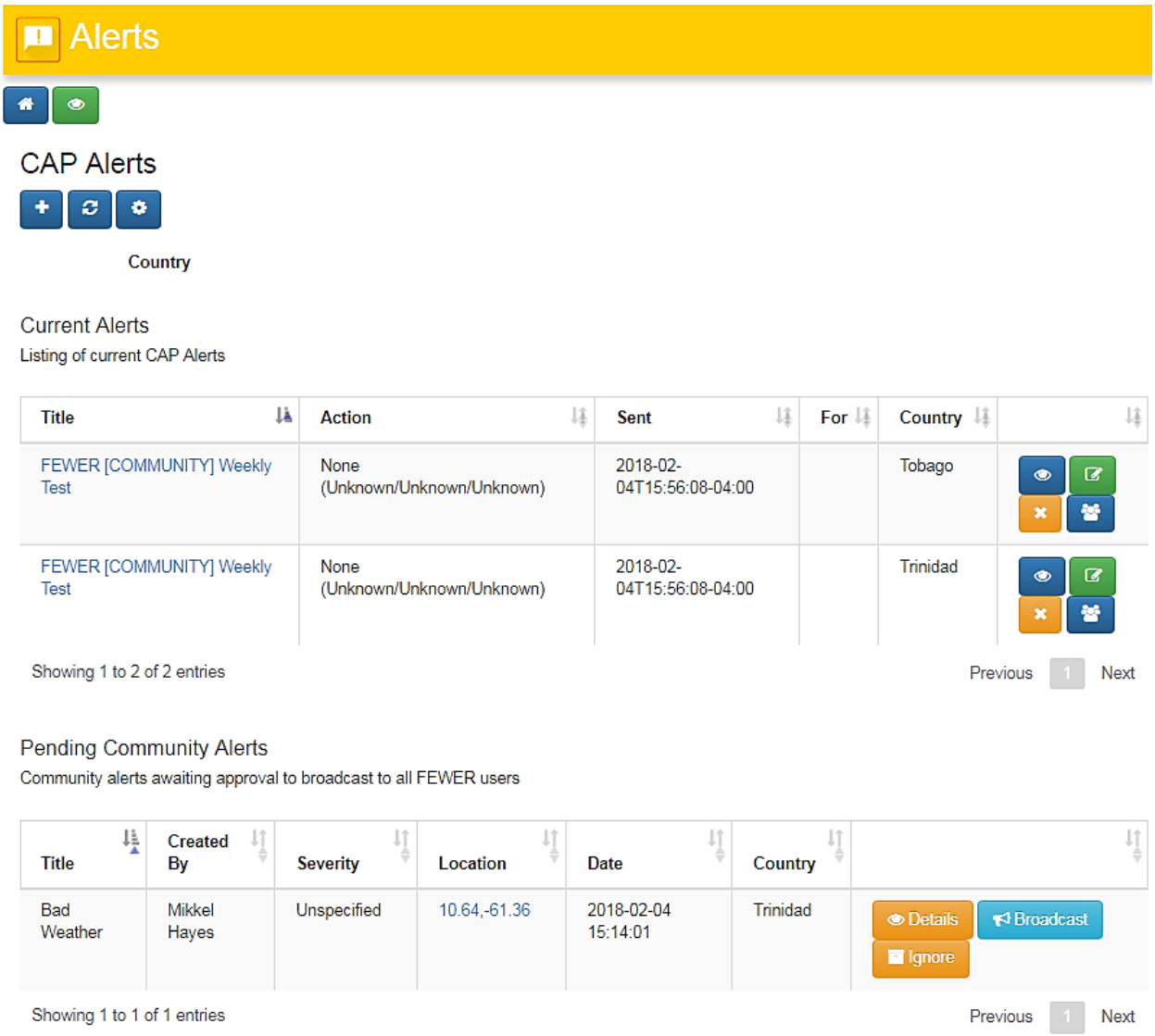


Figure 4.3 CAP Alerts and Pending Community Alerts controls and listings

4.1.5 How do I create a new CAP alert? (A.A, C.A, T.A)

To create a new CAP alert, select the plus icon, located at the top left of the CAP Alerts area of the Alerts dashboard. A form, comprising general information (Figure 4.4), details (Figure 4.10) and map-based alert area facilities (Figure 4.11), is displayed. Complete all mandatory fields (those marked with the red asterisks) and all other fields as appropriate. Table 4.2 summarises the fields and valid options for a FEWER CAP alert.

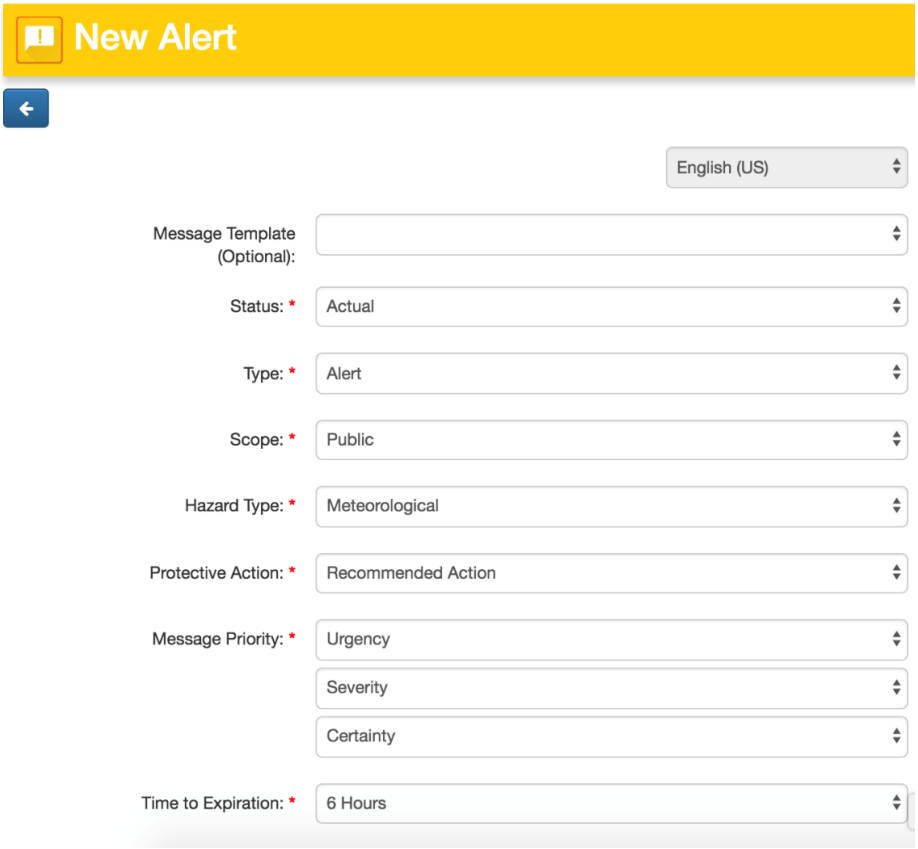


Figure 4.4 General section of a New CAP Alert

Table 4.2 Fields for General section of a New CAP Alert

Name	Description	Options
Message template	Pre-configured alert templates to enable faster creation of common alerts	FEWER Strange Current Alert FEWER Low Visibility Alert FEWER ground swell alert FEWER Whitecaps Alert FEWER Storm Surge Alert FEWER Coastal Flash Flood Alert FEWER [COMMUNITY] Weekly Test FEWER [COUNTRY] Monthly Test
Status	The code denoting the appropriate handling of the alert message	Actual Exercise Test Draft
Type	The code denoting the nature of the alert message	Alert Update Cancel
Scope	The code denoting the intended distribution of the alert message	Public Private

Name	Description	Options
Hazard Type	The extended message identifier(s) (in the form sender, identifier, sent) of an earlier CAP message or messages referenced by this one.	Meteorological Environmental Not Otherwise Categorized
Protective Action	The code denoting the type of action recommended for the target audience	Take Shelter Evacuate Make Preparations Execute Pre-Planned Action Avoid the Area Monitor Conditions Resume Normal Activities Take No Action
Message Priority: Urgency	The code denoting the urgency of the subject event of the alert message	Immediate Expected Future Already Occurred Future
Message Priority: Severity	The code denoting the severity of the subject event of the alert message	Extreme Severe Moderate Minor Unknown
Message Priority: Certainty	The code denoting the certainty of the subject event of the alert message	Observed Event Likely Possible Unlikely Unknown
Time to Expiration	The expiry time of the information of the alert message	15 minutes 30 minutes 45 minutes 1 hour 90 minutes 2 hours 3 hours 4 hours 5 hours 6 hours Other

4.1.6 Are the CAP field specifications unique to FEWER? (A.A, C.A, T.A)

No. The FEWER CAP alert fields comply with the Common Alerting Protocol. Protocol specifications are detailed at http://docs.oasis-open.org/emergency/cap/v1.2/CAP-v1.2-os.html#_Toc520973453.

4.1.7 What is a CAP template? (A.A, C.A, T.A)

CAP templates are the basis for creating stock as well as customised alerts. Each country specifies its own set of templates for national alerts. FEWER CAP templates have been created to serve the special

needs of seafaring fisherfolk. These extend the national portfolio of CAP alerts. The nominal set of FEWER CAP templates is shown in Figure 4.5.

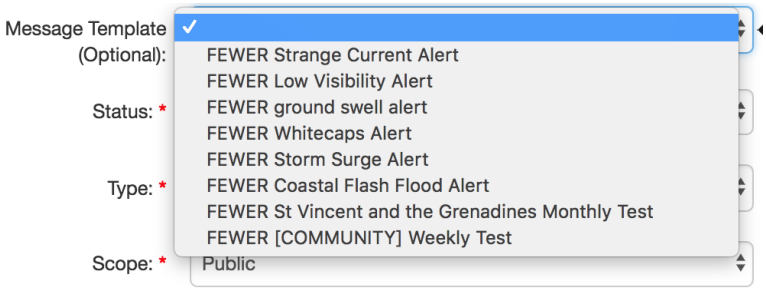


Figure 4.5 FEWER CAP templates

4.1.8 What is the Type of Message field? (A.A, C.A, T.A)

The CAP type of message comprises three components: status, code and scope. The status, in turn, has four possible values shown in Figure 4.6 as the drop-down options in the dashboard:

1. Actual – this is treated as an actionable alert for all users
2. Exercise – used for drills
3. Test – used for technical testing to ensure the system is working
4. Draft – a preliminary alert and not actionable at this time

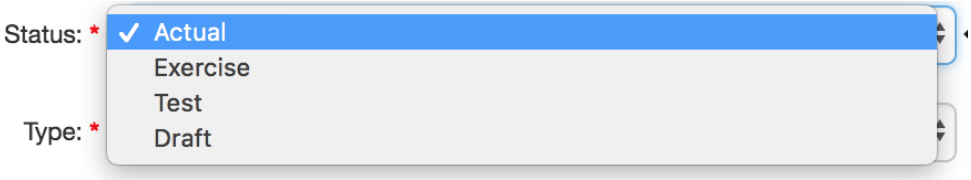


Figure 4.6 Drop-down options to complete CAP Alert Status

The type parameter in CAP field has three possible values as follows and shown as the dashboard drop down options in Figure 4.7:

1. Alert - initial information requiring attention by targeted recipients
2. Update - updates and supersedes the earlier message(s)
3. Cancel - cancels earlier message(s) identified

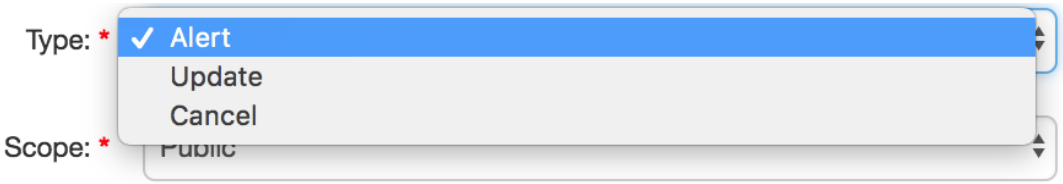


Figure 4.7 CAP Alert Code

The scope parameter in the CAP type of message field has three possible values as shown in the drop-down options in Figure 4.8:

1. Public - For general dissemination to unrestricted audiences
2. Private - For dissemination only to specified addresses.

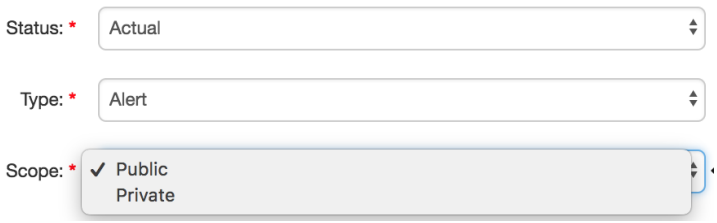


Figure 4.8 Type of Message options

4.1.9 What options does the Hazard field support? (A.A, C.A, T.A)

The CAP protocol specifies various categories of hazards: geophysical (including landslide), meteorological (including flood), safety (general emergency and public safety), security (law enforcement, military, homeland and local/private security), rescue and recovery, fire (suppression and rescue), health (medical and public health), Environmental (pollution and other environmental), transport (public and private transportation), Infrastructure (utility, telecommunications, other non-transport infrastructure), CBRNE (chemical, biological, radiological, nuclear or high-yield explosive threat or attack), and other events. FEWER CAP Hazard types include the environmental and other categories and refer to the met category as the weather. These are shown in Figure 4.9:

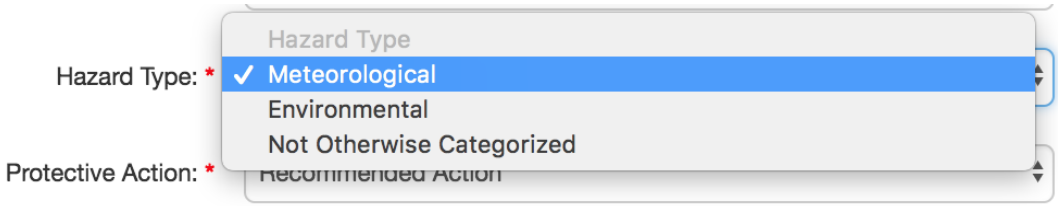


Figure 4.9 CAP Alert Hazard Type

4.1.10 What options does the Recommended Action field support? (A.A, C.A, T.A)

Protective action is a required field. It specifies the recommended actions for the intended audience. Its options are: take shelter, evacuate, make preparations, execute pre-planned action, avoid the area, monitor conditions, resume normal activities and take no action.

4.1.11 What options do the Message Priority fields support? (A.A, C.A, T.A)

The Message Priority fields (urgency, severity and certainty) are required. The respective options are:

- Urgency: immediate, expected, future, already occurred and unknown
- Severity: extreme, severe, moderate, minor, unknown
- Certainty: observed event, likely, possible, unlikely, unknown

4.1.12 What is the Time to Expire field? (A.A, C.A, T.A)

The Time to Expire field is optional. It refers to the expiry time of the information carried in the alert message. It has a default value of 6 hours.

4.1.13 What fields are included in CAP Alert Details? (A.A, C.A, T.A)

Figure 4.10 illustrates the Alert Details section of the New CAP Alert popup; Table 4.3 summarises the fields and elaboration follow.

The Event field is required. It provides further details of hazard type and is to be completed with brief text identifying the type of event conveyed in the alert message.
The short-text headline is a succinct, actionable headline. Some devices such as feature phones are only capable of displaying this headline. FEWER imposes a maximum limit of 140 characters to ensure

readability on such devices. An extended description of the hazard or event that occasioned this message is provided in the following field. Similarly, the “What should affected people do” provides the opportunity for further details of the protective action.

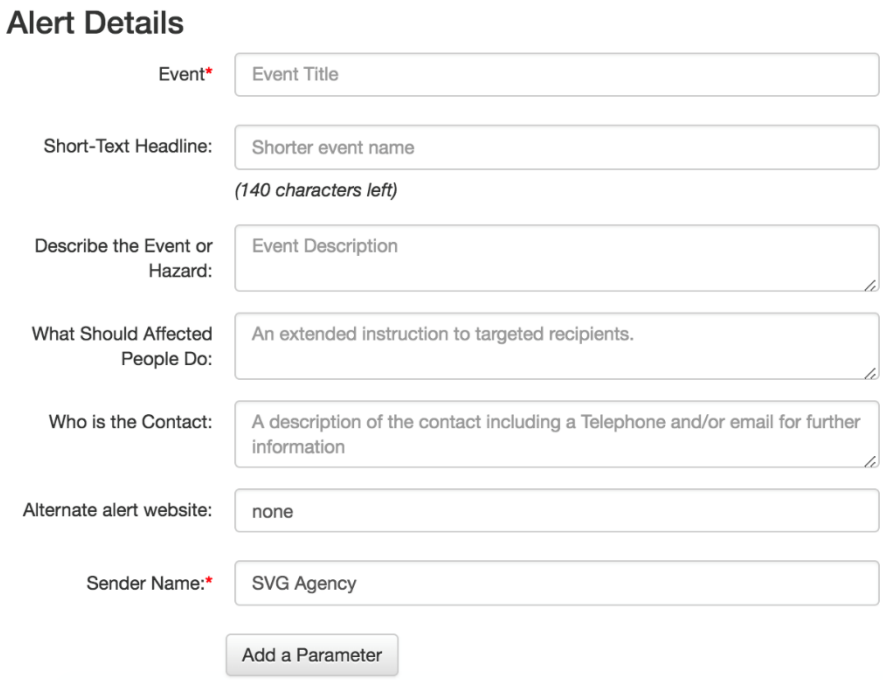


Figure 4.10 Details section of New CAP Alert popup

The optional contact field identifies the person or agency for follow-up and confirmation of the alert message. The sender Name refers to the agency or authority issuing the alert. The optional alternate alert website provides a full link to a web page or other text resource with additional or reference information regarding this alert.

Table 4.3 Fields for Details section of New CAP Alert popup

Name	Description	Options
Event	The text denoting the type of the subject event of the alert message	Open-ended text input
Short-Text Headline	A brief human-readable headline. It should be made as direct and actionable as possible while remaining short	Open-ended text input
Describe the Event or Hazard	An extended description of the hazard or event that occasioned this message	Open-ended text input
What Should Affected People Do	An extended instruction to targeted recipients	Open-ended text input
Who is the Contact	The text describing the contact for follow-up and confirmation of the alert message	Open-ended text input

Name	Description	Options
Alternate alert website	A full, absolute URI for an HTML page or another text resource with additional or reference information regarding this alert	Open-ended text input
Sender Name	The human-readable name of the agency or authority issuing this alert	Open-ended text input
Add Parameter	A system-specific additional parameter associated with the alert message	Open-ended text input

4.1.14 What does "Add a Parameter" mean in CAP Alert Details? (A.A, C.A, T.A)

FEWER provides the capability for customisation of an alert message through the creation of additional fields that extend the default set. For example, if an administrator wished to issue alerts in Creole instead of English, the Add a Parameter feature may be used to say create a field "Danje kalite" (hazard type) with a value "tan" (weather).

4.1.15 Can the area affected by a hazard be specified? (A.A, C.A, T.A)

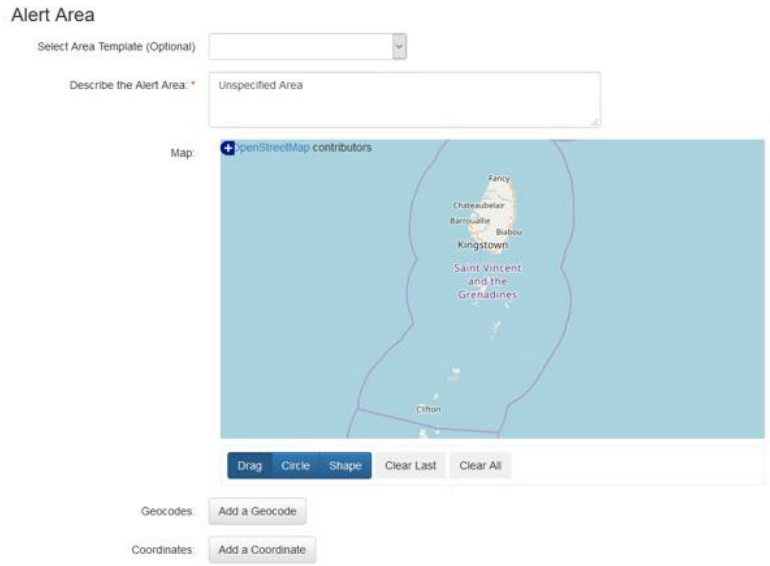


Figure 4.11 Alert Area section of New CAP Alert popup

Yes. You must include a textual description of the affected area and may specify the area affected by the alert in a number of ways as shown in Figure 4.11 and summarised in Table 4.4. Options are predefined templates for fisher communities, drawing a circle or polygon of the area on a map, specifying a geographic code ("geocode") or specific coordinates.

Table 4.4 Fields for Alert Area section of New CAP Alert popup

Name	Description	Options
Select Area Template	Pre-configured area templates to enable selection of affected areas	To be added
Describe the Alert Area	The text describing the affected area of the alert message	Open-ended text input
Map	Enable the visual selection of the area affected	Open-ended text input

Name	Description	Options
Geocodes	Geocodes are geographically-based code to describe a message target area. Use this button to add multiple locations affected by the alert	Open-ended text input
Coordinates	Coordinates are numerical GPS latitude and longitude values. Use the button to add GPS coordinates of locations affected by the alert	Open-ended text input
Review message content	Displays the raw alert based on specifications	N/A

The geocode delineates the affected area of the alert message using a variety of national or international standards including Specific Area Message Encoding (SAME) used in NOAA Weather Radio, ZIP codes etc. The *coordinates* option may be used if the hazard is located at a point rather than an area, or if it is known to be affecting a location, but the scope of the affected area is unknown.

4.1.16 Can any arbitrary person issue a FEWER CAP alert? (A.A, C.A, T.A)

No. CAP Alert creation requires an additional authentication to prevent accidental or unauthorised use.

4.1.17 Can CAP alerts be sent prematurely?

No. Figure 4.12a shows the visual indication that not all required fields have been set. When all fields are correctly configured, the cancel and release alert buttons become available as shown in Figure 4.12b.

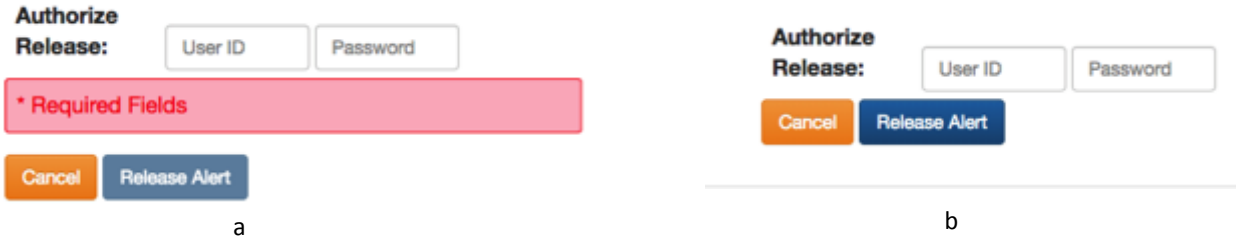


Figure 4.12 CAP Alert Authorisation

4.1.18 How do I update a CAP alert? (A.A, C.A, T.A)

A set of controls is available for the management of each alert. The green edit icon  in Figure 4.13 launches the screen used to configure an alert. The system references the unique identifier of the current alert in the specification of the new “Update Alert”. The remaining steps are similar to the process for creating a CAP alert. The system replaces the existing CAP alert with the matching unique identifier.

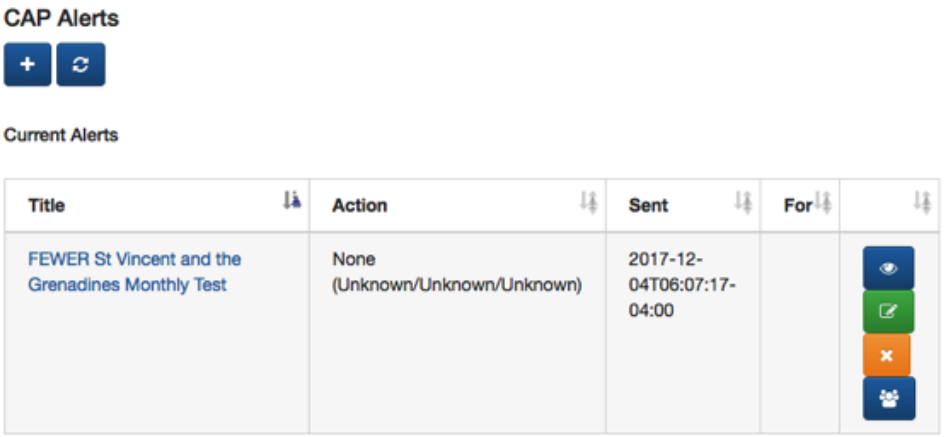


Figure 4.13 CAP Alerts listing within controls

4.1.19 How do I cancel a CAP alert? (A.A, C.A, T.A)

To cancel a CAP alert, follow the same process as the update then simply select the yellow cancel button instead.

4.1.20 How do I view how many members have viewed the CAP alert? (A.A, C.A, T.A, R.R)

To view the delivery confirmation of an alert, select the blue group icon in the menu shown in Figure 4.13. The system will navigate to the delivery confirmation page shown in Figure 4.14.

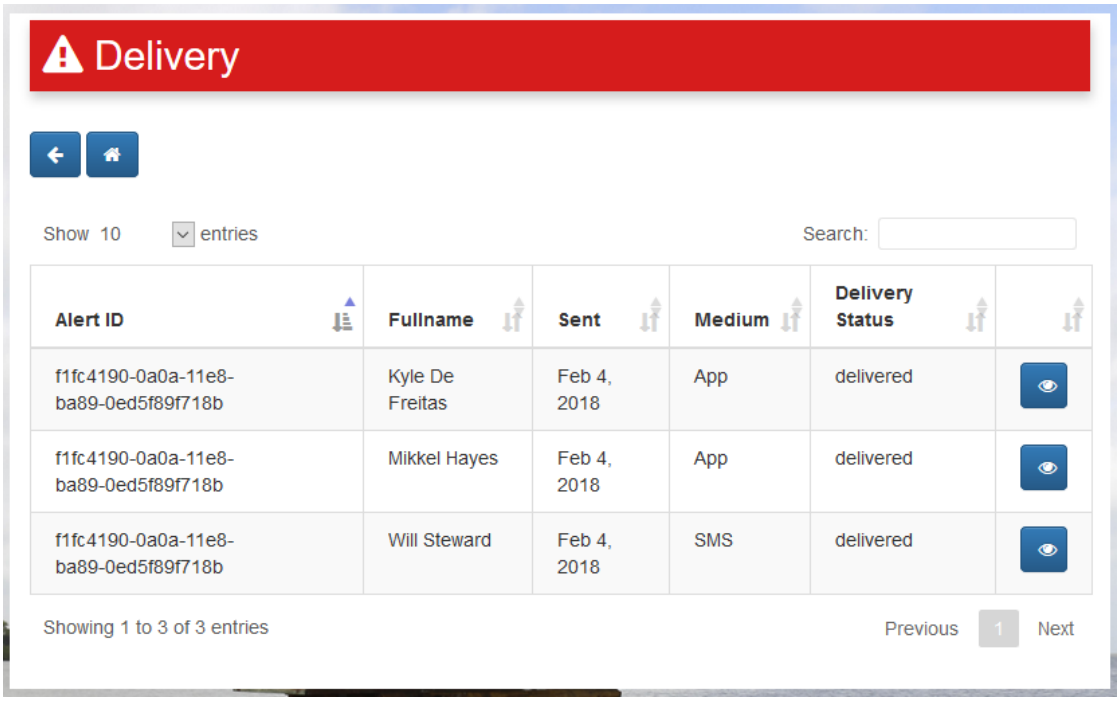


Figure 4.14 Alert Delivery Confirmation page

4.1.21 How do I view community alerts? (A.A, C.A, T.A, R.R)

In the Community Alerts area of the Alerts page, shown in Figure 4.15, select the desired Group from the drop-down menu on the top right.

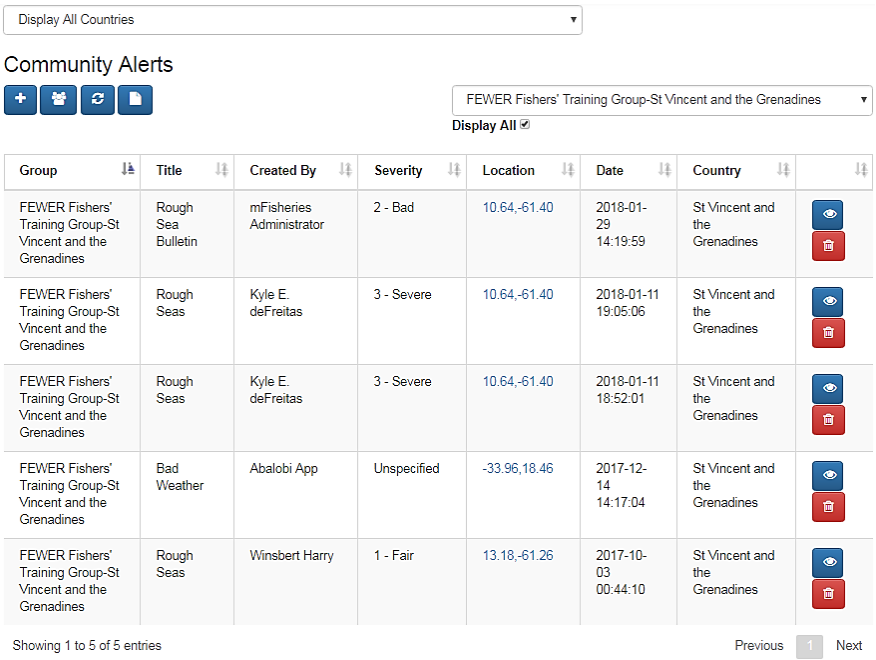


Figure 4.15 Community Alerts controls and listings

4.1.22 How do I view community alert groups? (A.A, C.A, T.A, R.R)

In the Community Alerts area of the Alerts page, select the group icon  to view alert groups.

4.1.23 How do I view members of an alert group? (A.A, C.A, T.A, R.R)

Select the Community Alert group of your choice from the listing, as shown in Figure 4.16.

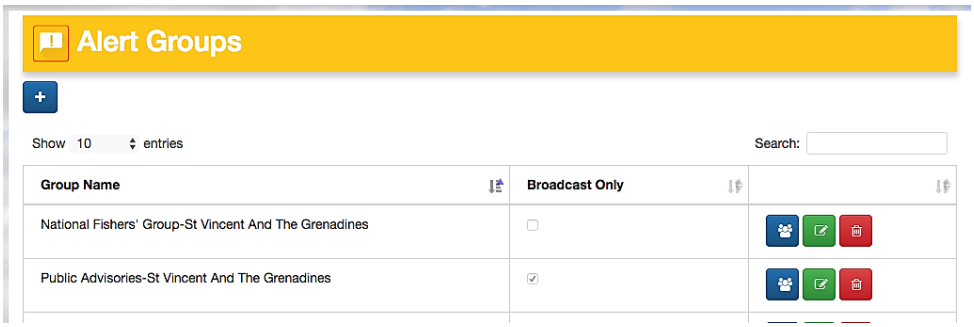


Figure 4.16 Community Alerts group listing

4.1.24 How do I create a new alert group? (A.A, C.A, T.A)

After navigating to Alert Groups, select the blue plus button in the top left corner. Complete the popup, shown in Figure 4.17 as necessary.

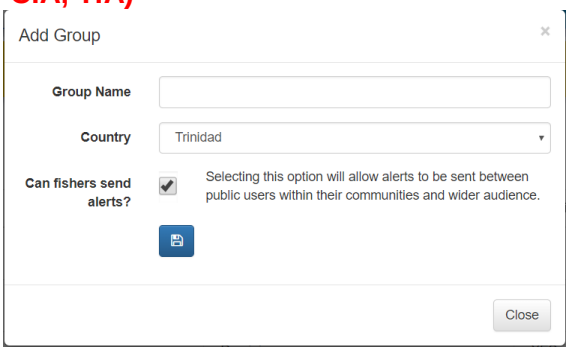


Figure 4.17 Creating a new alert group

4.1.25 How do I create a new community alert? (A.A, C.A, T.A)

After navigating to Community Alerts section in the Alert module dashboard, select the blue plus button in the top left corner,

Figure 4.18. Complete the popup shown in Figure 4.19, as necessary.

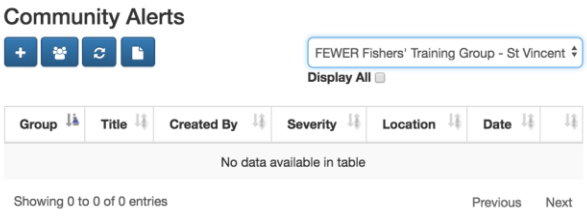


Figure 4.18 Create new community alert – select + icon

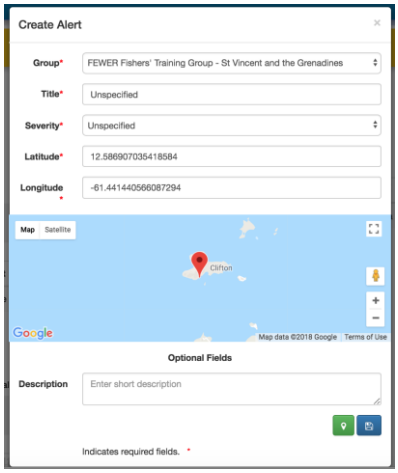


Figure 4.19 Provide details for new community alert

4.1.26 How do I update a community alert? (A.A, C.A, T.A)

To update a community alert, navigate to the Community Alerts area of the Alerts page, select the edit icon  in line with the relevant group as shown in Figure 4.20 and revise as appropriate. You will receive a prompt, shown in Figure 4.21, to confirm the update. When you confirm, you will receive a confirmation, shown in Figure 4.22, that the record has been successfully updated.

Figure 4.20 Community Alert Group Record controls

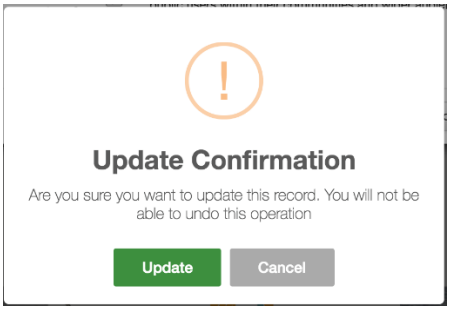


Figure 4.21 Alert group update confirmation

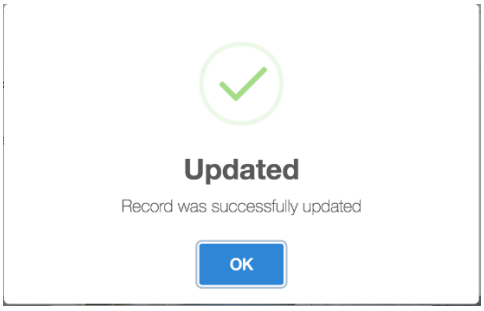


Figure 4.22 Alert group operation success

4.1.27 Can I construct a CAP alert from a community alert? (A.A, C.A, T.A)

Yes. Select the broadcast option, shown in Figure 4.23, for the alert entry of choice. This will launch the CAP alert creation form, shown in Figure 4.24, for the administrator to provide the additional information required to post a CAP alert to the wider audience, as explained earlier in this manual.

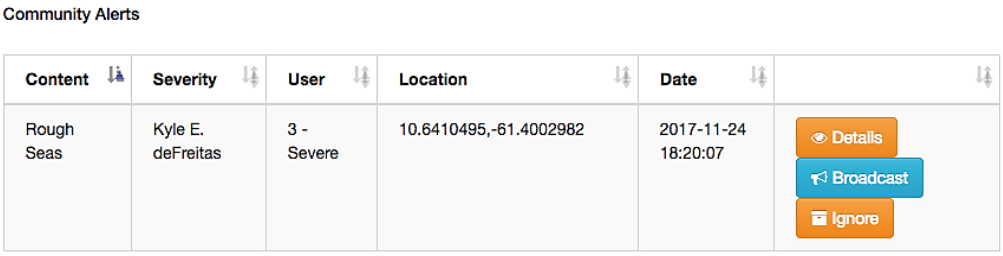


Figure 4.23 Community Alerts entry

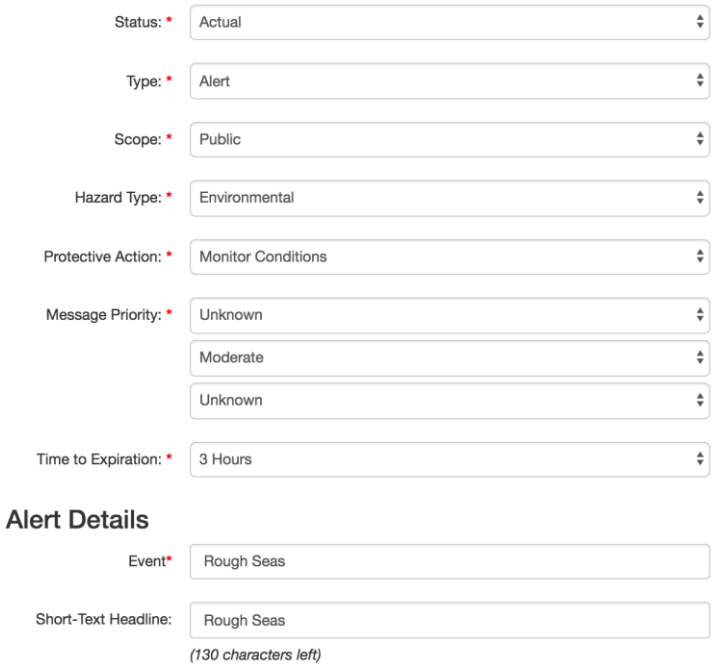


Figure 4.24 Community alert imported into CAP template

4.1.28 How do I export an administrator report from Community Alert records? (A.A, C.A, T.A, R.R)

To export the records listed in Community Alerts, we click on the blue button with the “page” icon in the top left corner of the Community Alerts section of the Alerts dashboard as shown in Figure 4.25.

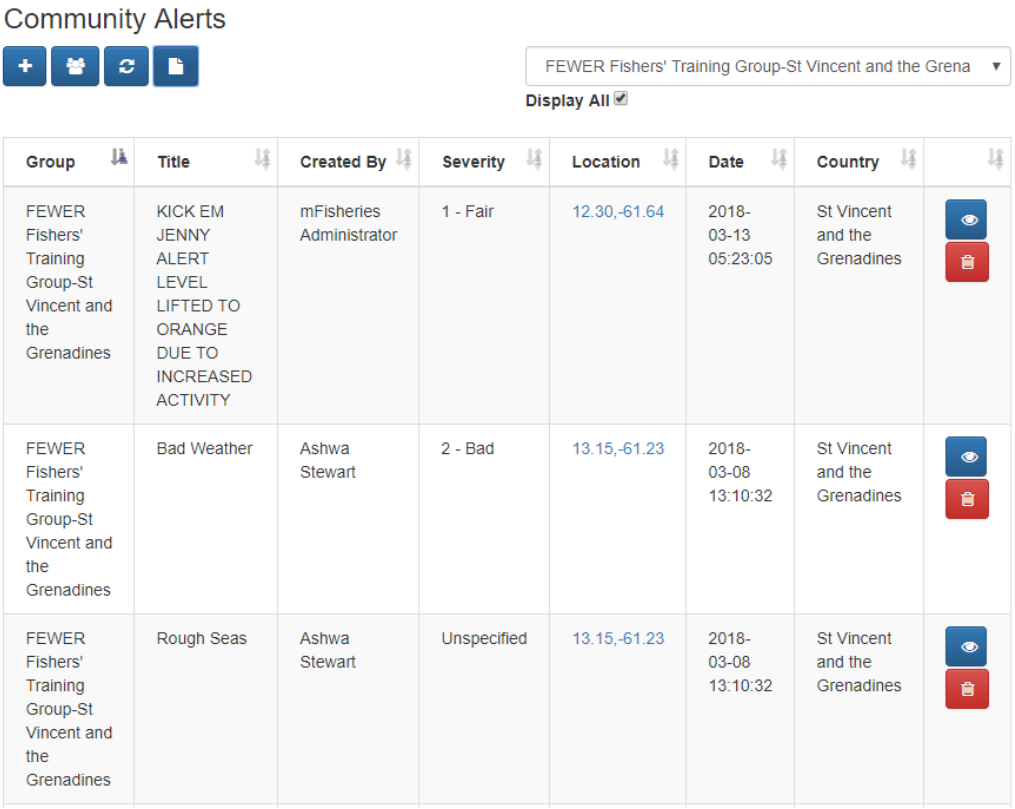


Figure 4.25 Community Alerts Administrator report button

After the button is clicked, the system will generate a report formatted as a comma separated value (CS) file. The report contains the set of records displayed. The downloaded CSV file can be opened in Microsoft Excel to view the operations within the file. An example of the report viewed in Excel is provided in Figure 4.26.

A	B	C	D
Group	Title	Created By	Severity
FEWER Fishers' Training Group-St Vincent and the Grenadines	KICK EM JENNY ALERT LEVEL LIFTED TO ORANGE DUE TO INCREASED ACTIVITY	mFisheries Administrator	1 - Fair
FEWER Fishers' Training Group-St Vincent and the Grenadines	Bad Weather	Ashwa Stewart	2 - Bad
FEWER Fishers' Training Group-St Vincent and the Grenadines	Rough Seas	Ashwa Stewart	Unspecified
FEWER Fishers' Training Group-St Vincent and the Grenadines	Rough Seas	Sam Bracken	Unspecified
FEWER Fishers' Training Group-St Vincent and the Grenadines	Rough Seas	Peter Regis	3 - Severe
FEWER Fishers' Training Group-St Vincent and the Grenadines	Injured Person onboard	Ashwa Stewart	0 - Not Applicable
FEWER Fishers' Training Group-St Vincent and the Grenadines	Rough Seas	Ren Roy	2 - Bad
FEWER Fishers' Training Group-St Vincent and the Grenadines	Bad Weather	winsbert hazlewood	Unspecified
FEWER Fishers' Training Group-St Vincent and the Grenadines	Rough Seas	Don O'Garro	3 - Severe
FEWER Fishers' Training Group-St Vincent and the Grenadines	Boat damaged / sinking	Ren Roy	0 - Not Applicable

Figure 4.26 Example of an administrator report using Community Alert records.

4.2 Damage Reporting

4.2.1 How do I access the Damage Reporting Module? (A.A, C.A, T.A, R.R)

After logging in to the FEWER Administrators' dashboard using your administrator credentials, click the FEWER drop down in the main menu and select the Damage Reporting module from the list, as shown in Figure 4.27.

Figure 4.27 Accessing the Damage Reporting module from the FEWER main menu

FEWER's Damage Reporting dashboard displays categories on the left and report entries on the right, as shown in Figure 4.28.

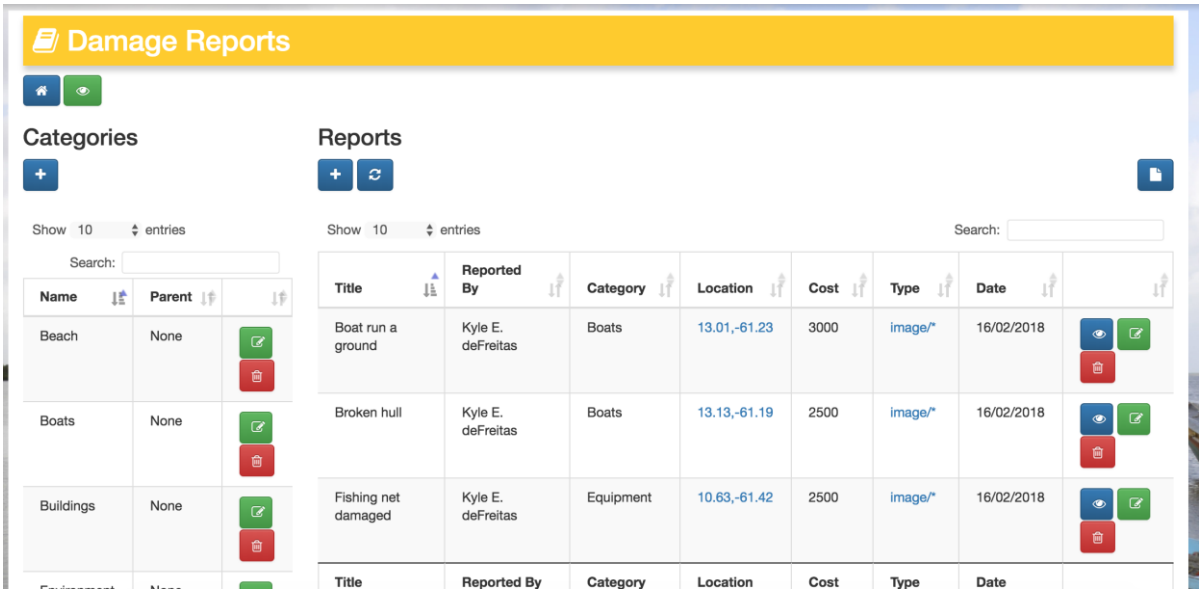


Figure 4.28 Damage Reporting dashboard showing listings and controls

4.2.2 How are damage reports organised in FEWER? (C.A, T.A)

FEWER organises damage reports in categories. A report is assigned to only one category. The list of default configured categories is shown in Figure 4.29.

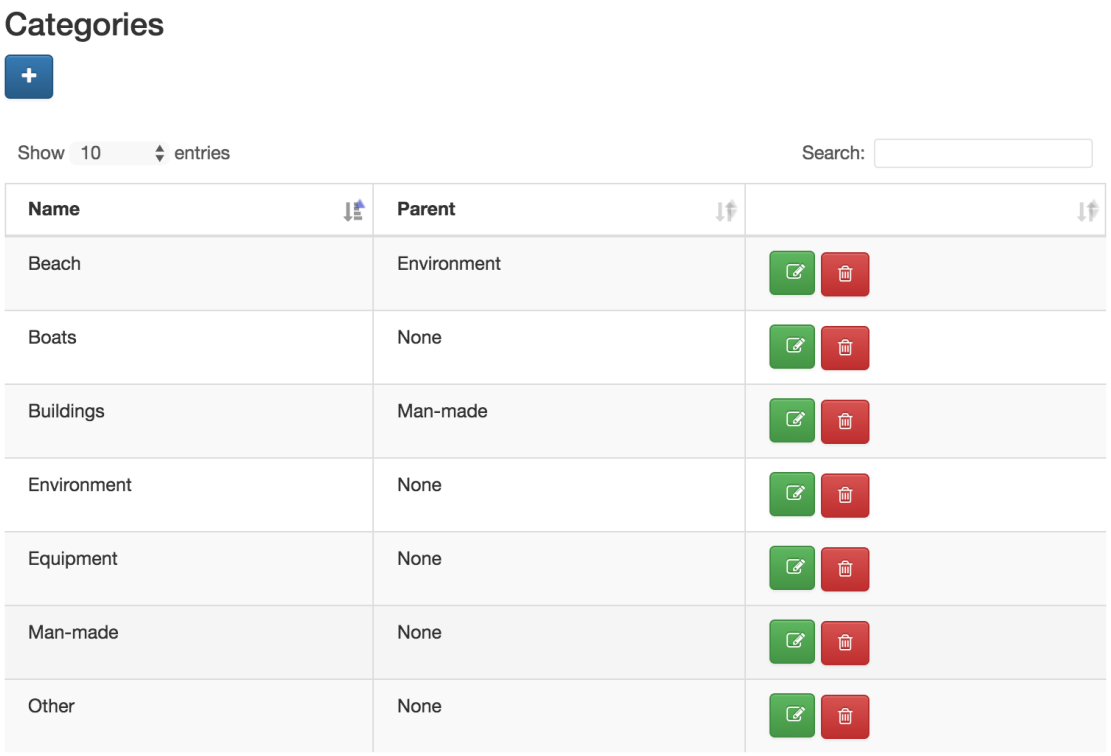


Figure 4.29 Default Damage Report Categories

To provide flexibility in reporting and the categorisation of damage reports, the public user can choose either general or specific categories. These categories are represented in a parent-child hierarchical relationship. For example, Environment is a general category and Beach is a specific category. Environment is the parent category of beach. The hierarchical categorisation provides the opportunity for further analysis of reports as FEWER is utilised by public users.

4.2.3 How do I create a damage report category? (C.A, T.A.)

Select the blue plus button illustrated in Figure 4.29. This will launch a window to enter the name of the new category. You can specify if the new category is related to any of the existing categories. Figure 4.30 shows this window. Once the category is created successfully, the system will display a message asking for your acknowledgement as shown in Figure 4.31.

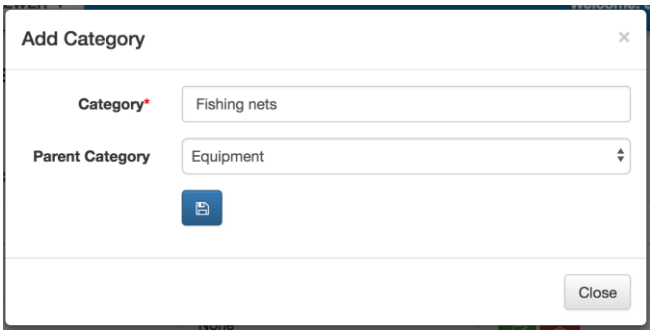


Figure 4.30 Form to create new Category

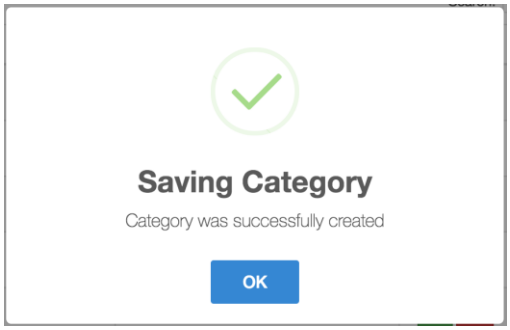


Figure 4.31 Damage Reporting Category success notification

4.2.4 How do I view damage reports? (A.A, C.A, T.A, R.R)

The area on the right of the Damage Reporting dashboard, shown in Figure 4.28, displays the listing of public damage reports made by the public users in the host country. This area is shown on its own in Figure 4.32.

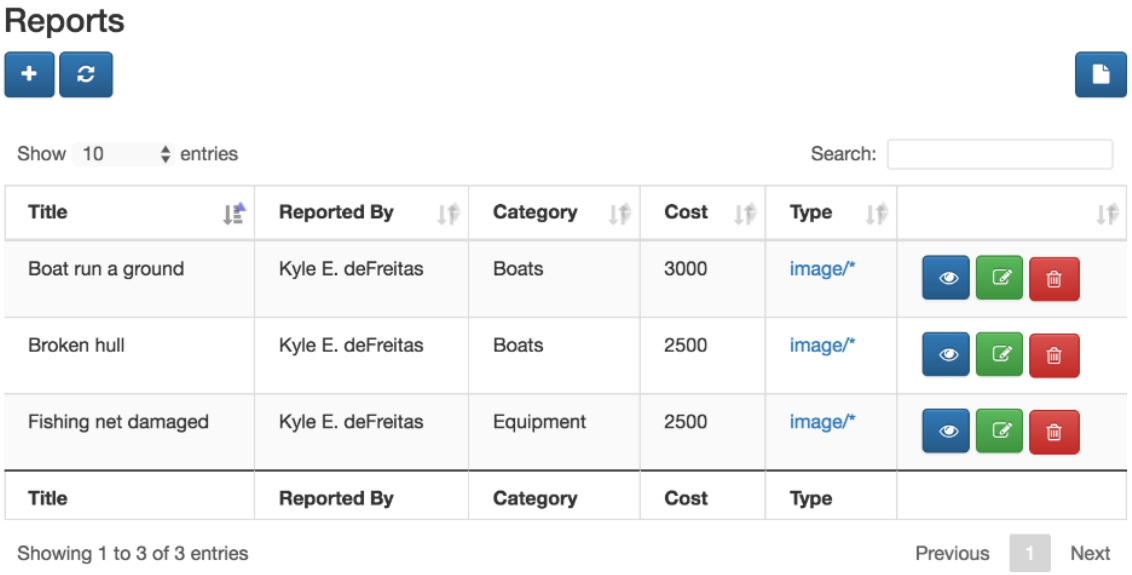


Figure 4.32 listing of Damage Reports

4.2.5 How do I create a damage report? (A.A, C.A, T.A)

Click on the blue button with the "plus" icon (Figure 4.32) at the top left of the Damage Reports dashboard to open a damage report creation form shown in Figure 4.33. The report fields are summarised in Table 4.5. The report can be created by the public user using the mobile app. Figure 4.34 shows the post on mobile after the report is constructed.

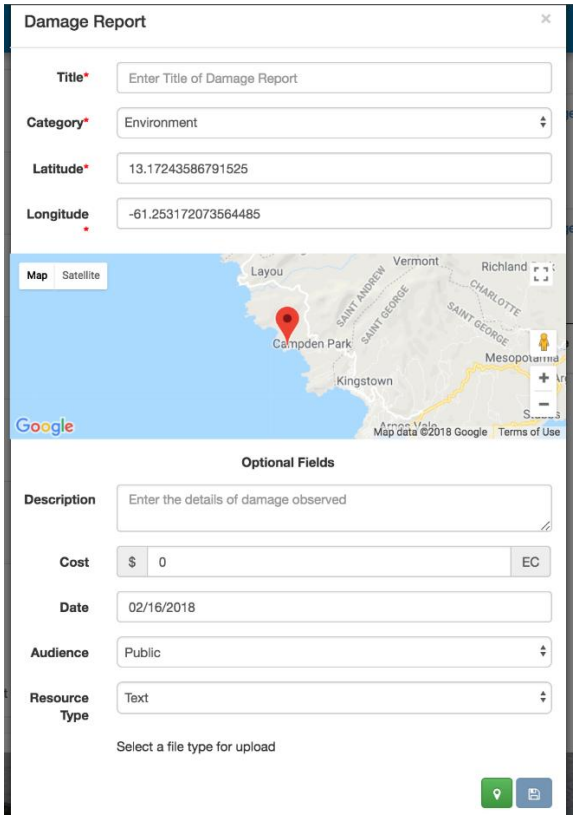


Figure 4.33 Create Damage Report Form

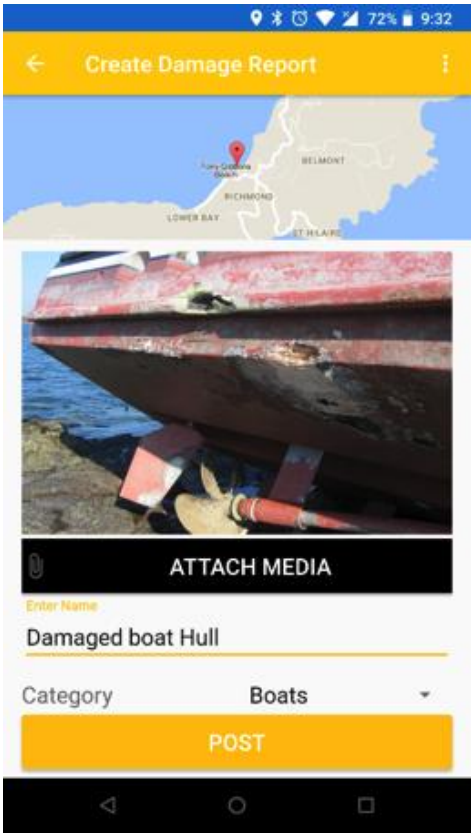


Figure 4.34 Damage Report Post as seen on mobile

Table 4.5 Damage Report Fields

Name	Description	Options
Title	The title an author wishes to associate with a report	Open-ended text input
Category	The category of damage to be reported	Beach Boats Buildings Environment Equipment Man Made Other
Latitude	Estimated or exact latitude at which damage occurred	The default is automatically filled in as the latitude of the input device
Longitude	Estimated or exact longitude at which damage occurred	The default is automatically filled in as longitude of input device
Description	Details of the damage observed	Open-ended text input
Cost	Estimated cost of damage in EC$	Open-ended text input

Name	Description	Options
Date	Date damage occurred	Specification through a choice of calendar or textual date with selection controls for each field: day, month, year
Audience	Scope of persons who may view this damage report	Public (all FEWER users can view this damage report) Private (only the author of a report can view it)
Resource Type	Medium used to record evidence of the damage	Text Image Audio Video
Upload File	Upload a file that provides evidence of damage	Upload by selecting file through file explorer

4.2.6 How do I update a damage report? (A.A, C.A, T.A)

Click on the green edit button next to a damage report record (Figure 4.32) to open the popup window to update its details. The popup window with details for editing is illustrated in Figure 4.35.

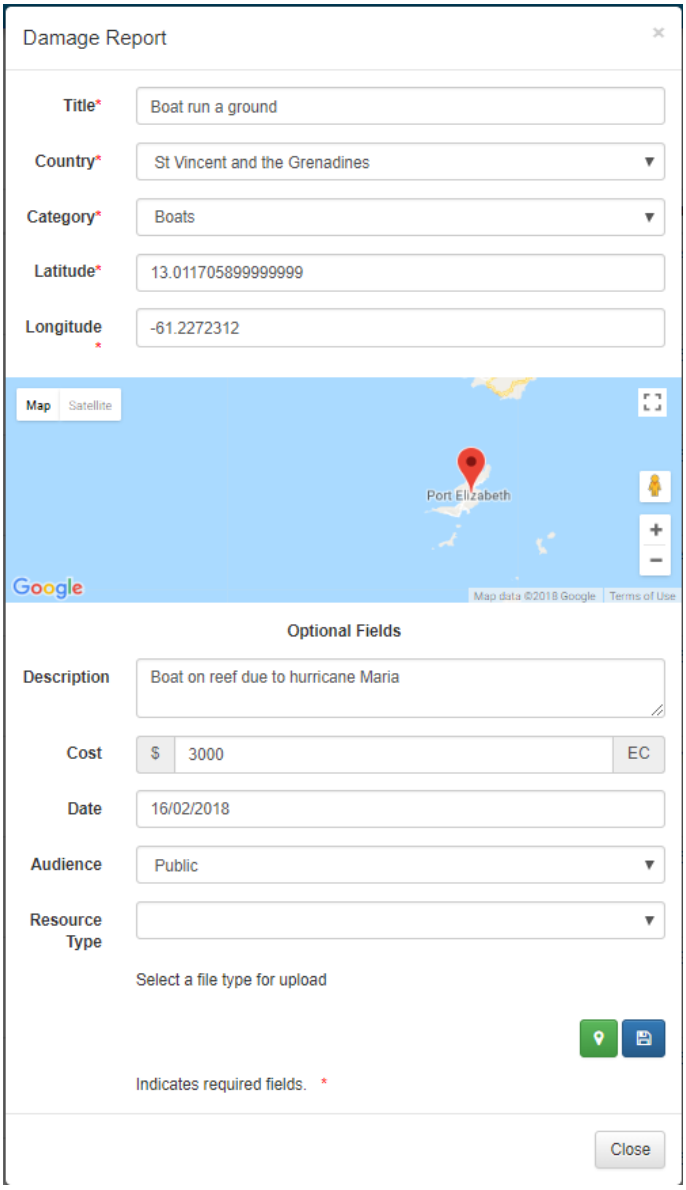


Figure 4.35 Damage report update form

4.2.7 How do I delete a damage report? (C.A, T.A.)

Navigate to the damage reporting dashboard to see the list of reports. The dashboard provides several operations that can be performed on each entry. These are available through icons that appear in the right-most column of the record. The list and operations are illustrated in Figure 4.32.

The set of operations includes delete. This is accessed through the red trash can icon. Clicking the red delete button of the record, will display a confirmation for deleting the record.

Special care must be exercised when deleting and updating records because there is no undo operation within FEWER. After the request is sent the system displays a notification message to confirm whether the operation was successful.

4.2.8 How do I export an administrator report from damage reports? (A.A, C.A, T.A, R.R)

To export the records listed in a damage report, we click on the blue button with the "page" icon in the top right corner of the Damage Reporting dashboard as shown in Figure 4.36.

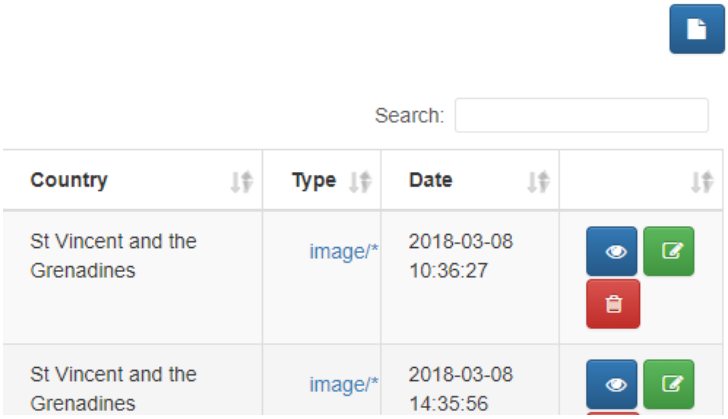
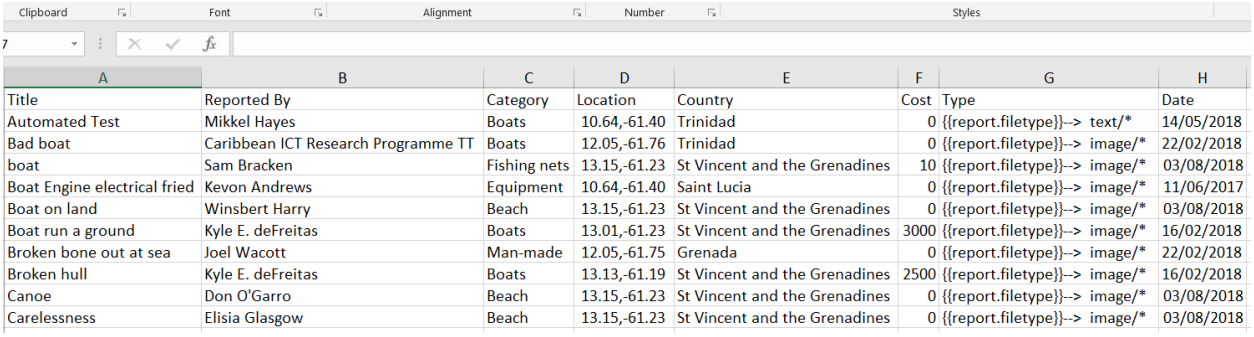


Figure 4.36 Damage Reporting Administrator report button

After the button is clicked, the system will generate a report formatted as a comma separated value (CS) file. The report contains the set of records displayed. The downloaded CSV file can be opened in Microsoft Excel to view the operations within the file. An example of the report viewed in Excel is provided in Figure 4.37.



Title	Reported By	Category	Location	Country	Cost	Type	Date
Automated Test	Mikkel Hayes	Boats	10.64,-61.40	Trinidad	0	{{report.filetype}}--> text/*	14/05/2018
Bad boat	Caribbean ICT Research Programme TT	Boats	12.05,-61.76	Trinidad	0	{{report.filetype}}--> image/*	22/02/2018
boat	Sam Bracken	Fishing nets	13.15,-61.23	St Vincent and the Grenadines	10	{{report.filetype}}--> image/*	03/08/2018
Boat Engine electrical fried	Kevon Andrews	Equipment	10.64,-61.40	Saint Lucia	0	{{report.filetype}}--> image/*	11/06/2017
Boat on land	Winsbert Harry	Beach	13.15,-61.23	St Vincent and the Grenadines	0	{{report.filetype}}--> image/*	03/08/2018
Boat run a ground	Kyle E. deFreitas	Boats	13.01,-61.23	St Vincent and the Grenadines	3000	{{report.filetype}}--> image/*	16/02/2018
Broken bone out at sea	Joel Wacott	Man-made	12.05,-61.75	Grenada	0	{{report.filetype}}--> image/*	22/02/2018
Broken hull	Kyle E. deFreitas	Boats	13.13,-61.19	St Vincent and the Grenadines	2500	{{report.filetype}}--> image/*	16/02/2018
Canoe	Don O'Garro	Beach	13.15,-61.23	St Vincent and the Grenadines	0	{{report.filetype}}--> image/*	03/08/2018
Carelessness	Elisia Glasgow	Beach	13.15,-61.23	St Vincent and the Grenadines	0	{{report.filetype}}--> image/*	03/08/2018

Figure 4.37 Example of an administrator report using Damage Reporting records

4.3 Emergency Contacts

4.3.1 How do I access the emergency contacts module? (A.A, C.A, T.A, R.R)

After logging in to the FEWER administrators' dashboard using the credentials provided, click the FEWER drop down in the main FEWER menu and select the Emergency Contacts option from the list as shown in Figure 4.38.

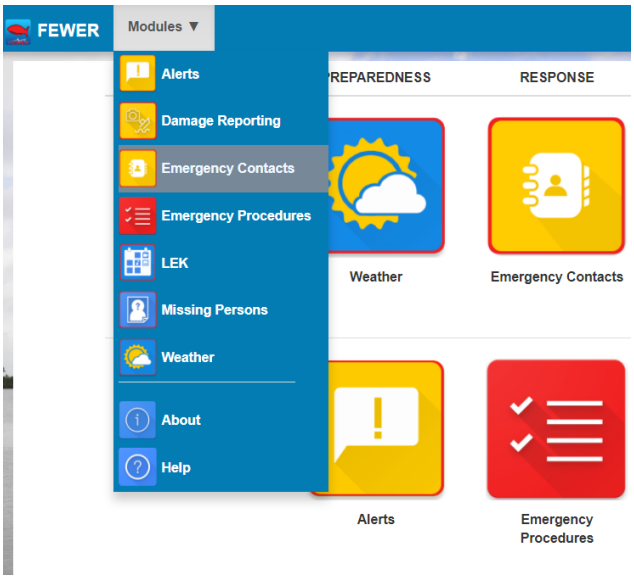


Figure 4.38 Accessing Emergency Contacts from menu

4.3.2 How do I view emergency contacts? (A.A, C.A, T.A, R.R)

When the Emergency Contacts option is selected, the system will display its dashboard, Figure 4.39, showing all the emergency contacts in the system for the administrator's country. There is a standard set of information for each contact as shown in the figure, but additional fields may be included when a new contact is created. The details column identifies the number of additional items of information provided beyond the standard set.

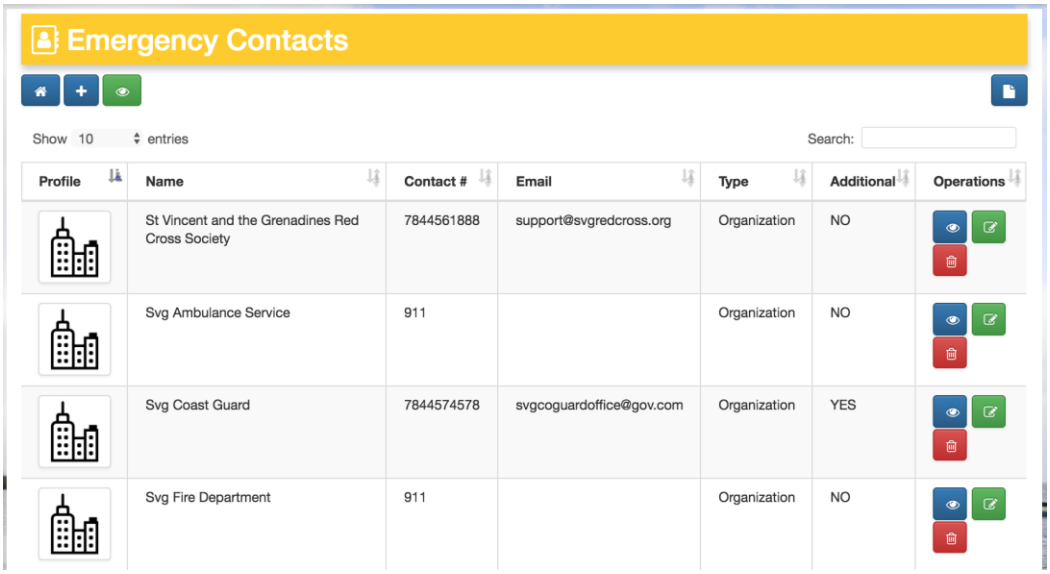


Figure 4.39 Emergency Contacts dashboard

4.3.3 Can fishers see emergency contacts countries other than their own?

Yes. Emergency contact information for all countries is accessible by all FEWER fishers. This enables fishers who drift into territories outside of their own to access the relevant contacts in the event of an emergency.

4.3.4 How do I view emergency contact details? (A.A, C.A, T.A, R.R)

On the Emergency Contacts dashboard, click on the eye icon  to open a window displaying emergency contact information as shown in Figure 4.40.

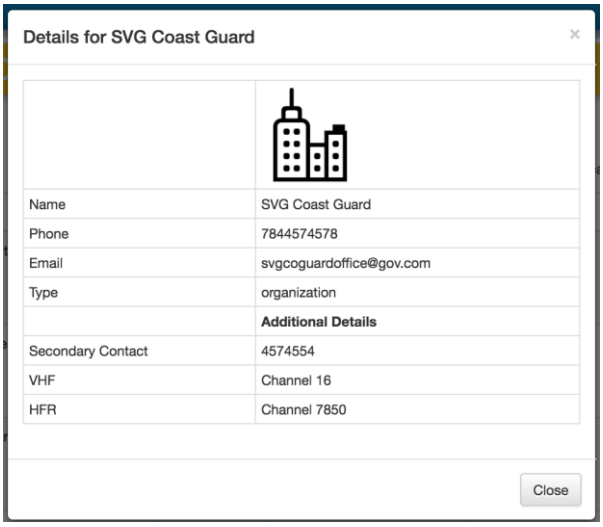


Figure 4.40 Details of an emergency contact entry

4.3.5 How do I create an emergency contact? (C.A, T.A.)

Click on the blue plus button at the top left of the Emergency Contacts dashboard to launch a window to enter the specifics of a new emergency contact, as shown in Figure 4.41. Once the contact has been successfully added, the system will display an appropriate message as shown in Figure 4.42.

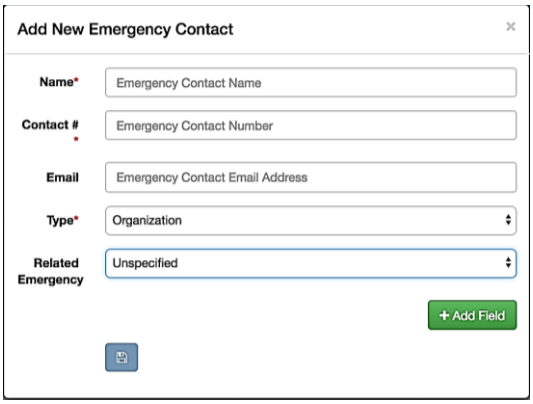


Figure 4.41 Add emergency contact details

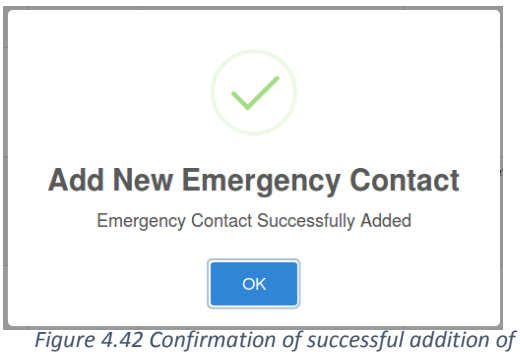


Figure 4.42 Confirmation of successful addition of emergency contact

4.3.6 How do I update an emergency contact? (C.A, T.A.)

In the Emergency Contacts dashboard click on the green edit icon  for the record to be updated, as shown in Figure 4.43. This opens a popup window with the contact details for an existing contact. It will appear as a completed version of the window shown in Figure 4.41. Update fields as appropriate.

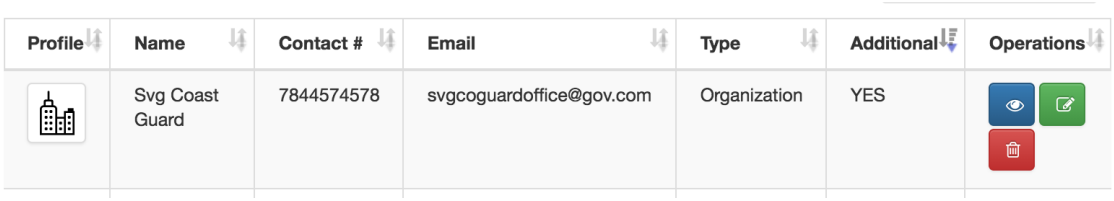


Figure 4.43 Emergency contact listing

On successful update, a confirmation message, shown in Figure 4.44 is displayed.

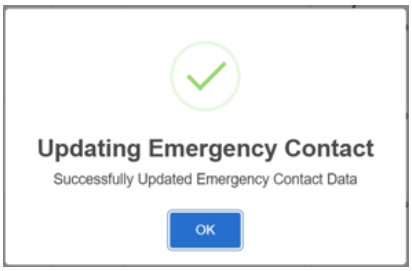


Figure 4.44 Emergency contact update window

4.3.7 How do I provide additional details for an emergency contact? (C.A, T.A.)

Click on the "Add Field" button in the *Add New Emergency Contact* window to include an extra field. This is shown in Figure 4.45. The additional fields store information in key-value pairs. The key represents the label of the characteristic about the contact while the value represents the information that is recorded. For example, a common additional detail for the coast guard will be the key "VHF radio" and the value "Channel 16".

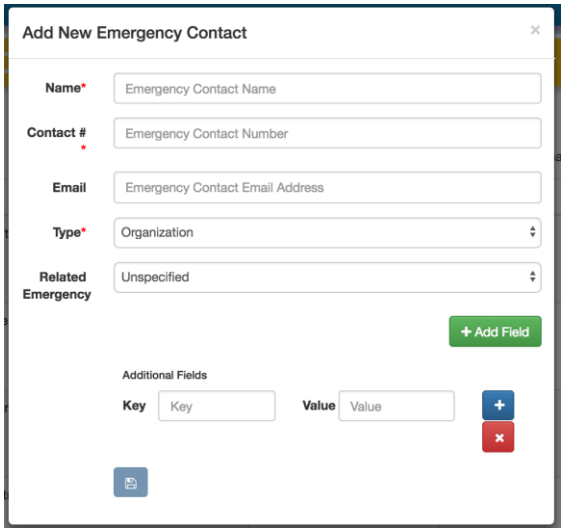


Figure 4.45 Add additional emergency contact details

4.3.8 How do I delete an emergency contact? (C.A, T.A.)

Click on the red trash can button for the entry to be deleted, shown Figure 4.39. This displays a delete confirmation message, Figure 4.46, before deleting the emergency contact.

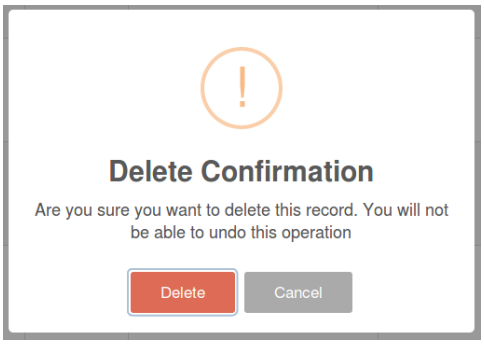


Figure 4.46 Delete confirmation for emergency contact

Special care must be exercised when deleting and updating records because there is no undo operation within FEWER. After the request is sent the system displays a notification message to notify whether the operation was successful.

4.3.9 How do I view contacts from another country? (A.A, C.A, T.A, R.R)

To view contacts from another country, select eye icon  in the emergency contact dashboard to access the full public listing of all emergency contacts. Select the desired country using the drop-down menu as shown in Figure 4.47.

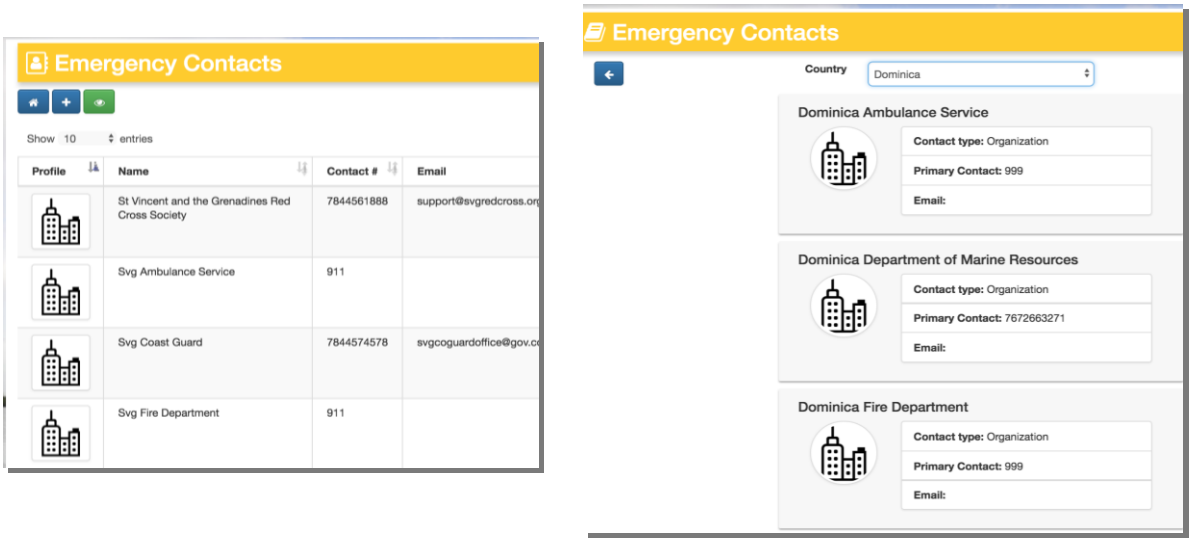


Figure 4.47 View emergency contacts from another country

4.3.10 How do I export an administrator report from Emergency Contact records? (A.A, C.A, T.A, R.R)

To export the records listed in Emergency Contacts, we click on the blue page button in the top right corner of the Emergency Contacts dashboard as shown in Figure 4.48.

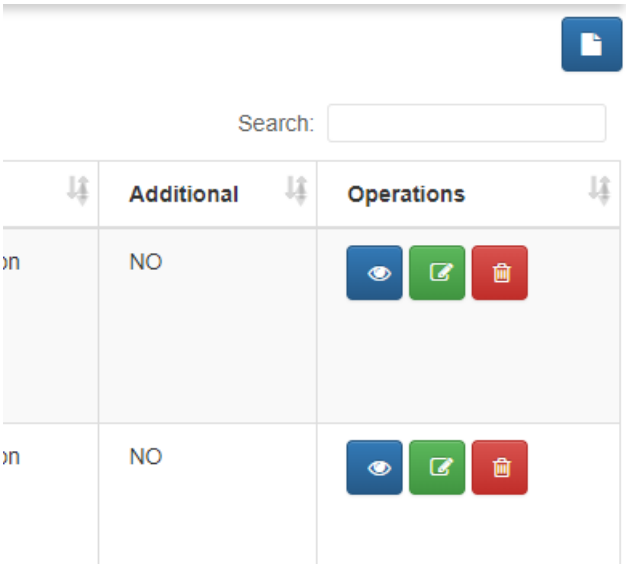


Figure 4.48 Emergency Contacts Administrator report button

After the button is clicked, the system will generate a report formatted as a comma separated value (CS) file. The report contains the set of records displayed. The downloaded CSV file can be opened in Microsoft Excel to view the operations within the file. An example of the report viewed in Excel is provided in Figure 4.49.

Clipboard | Font | Alignment | Number | Styles

F10

	A	B	C	D	E	F
1	Name	Contact #	Email	Country	Type	Additional
2	St Vincent and the Grenadines Red Cross Society	7844561888	support@svgredcross.org	St Vincent and the Grenadines	Organization	0 --> NO
3	Svg Ambulance Service	911		St Vincent and the Grenadines	Organization	0 --> NO
4	Svg Coast Guard	7844574578	svgcoguard@vincysurf.com	St Vincent and the Grenadines	Organization	0 --> 0" class="ng-scope">YES 0 -->
5	Svg Fire Department	911		St Vincent and the Grenadines	Organization	0 --> NO
6	Svg Fisheries Division	7844562738	fishdiv@caribsurf.com	St Vincent and the Grenadines	Organization	0 --> NO
7	Svg Police Service	911		St Vincent and the Grenadines	Organization	0 --> NO

Figure 4.49 Example of an administrator report using Emergency Contacts records

4.4 Emergency Procedures

4.4.1 How do I access the Emergency Procedures module? (A.A, C.A, T.A, R.R)

After logging in to the FEWER administrators' dashboard using appropriate credentials; click the FEWER option in the menu and select the Emergency Procedures option from the menu list (Figure 4.50).

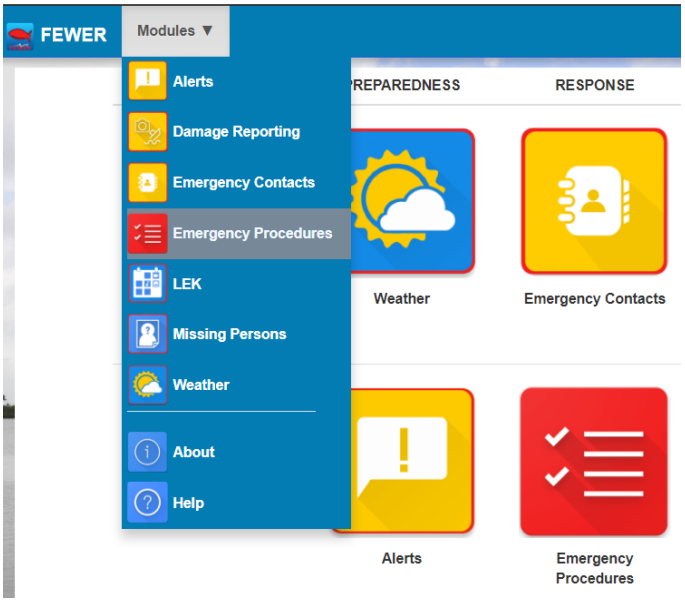


Figure 4.50 Accessing emergency procedures from menu

This displays the Emergency Procedures dashboard, which is configured as a table whose records show a listing of procedures available for the host country as shown in Figure 4.51.

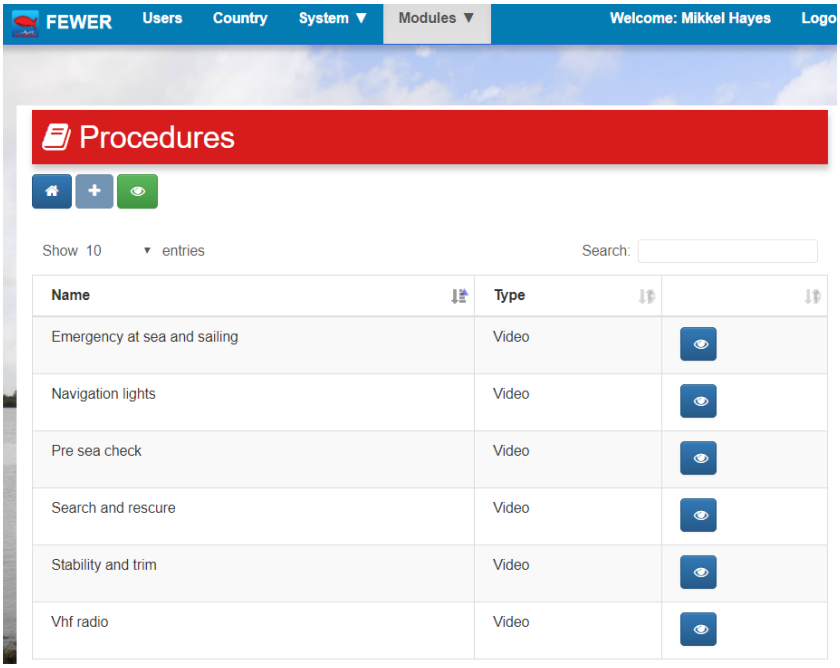


Figure 4.51 Emergency Procedure dashboard

4.4.2 How do I view the details of an emergency procedure? (A.A, C.A, T.A, R.R)

Click on the blue eye icon  on the dashboard, Figure 4.51. The video for the selected emergency procedure will be displayed in a pop-up window.

4.4.3 How do I upload emergency procedures content? (C.A, T.A.)

To upload content to the emergency procedure module, click on the blue plus icon in the top left corner of the dashboard as shown in Figure 4.52.

This opens a popup window to select a zip file containing all the videos to be uploaded for host country's emergency procedure.

Videos for the Emergency procedures are stored on the phone to allow fisherfolk to access procedures without internet access. Therefore, strong consideration should be given for ensuring that video files are reasonably small for the limited space available on phones.

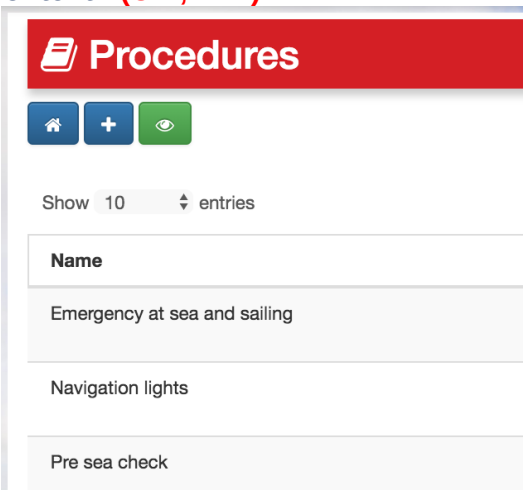


Figure 4.52 Upload Emergency Procedure icon

The following steps are recommended for preparing video files for upload:

1. Using a video compression software. We recommend Handbrake (https://handbrake.fr/), a free and open source software that performs all the needed operations.
2. The Handbrake software has preconfigured options for compression. We recommend that you use the option "Gmail Small 10 minutes".
    a. This compresses the video file in the MP4 format
    b. Reduces the framerate to 30 FPS
    c. And optimizes the video for the web.
3. Using this setting we were able to compress a 170MB video to only 3MB while maintaining compatibility with majority Android and web browsers.

4.4.4 How do I edit emergency procedures details? (C.A, T.A)

Procedures are packages and downloaded collectively on the fisher's phone. The videos are compressed and packaged in a zip archive. Editing country procedures requires that the entire set of video resources in the zip archive for the host country be re-uploaded and current procedure videos are replaced. The steps for uploading emergency procedures are given in section 4.4.3.

4.4.5 How do I delete an emergency procedure? (C.A, T.A)

FEWER does not support the deletion of existing emergency procedures. Therefore, no delete option in the list of procedures, as highlighted in Figure 4.51, was provided.

4.5 Local Ecological Knowledge

4.5.1 How do I access the Local Ecological Knowledge (LEK) module? (A.A, C.A, T.A, R.R)

After logging into the FEWER Administrators' dashboard using your administrator credentials, click the FEWER drop down in the main menu and select the LEK module from the list, as shown in Figure 4.53.

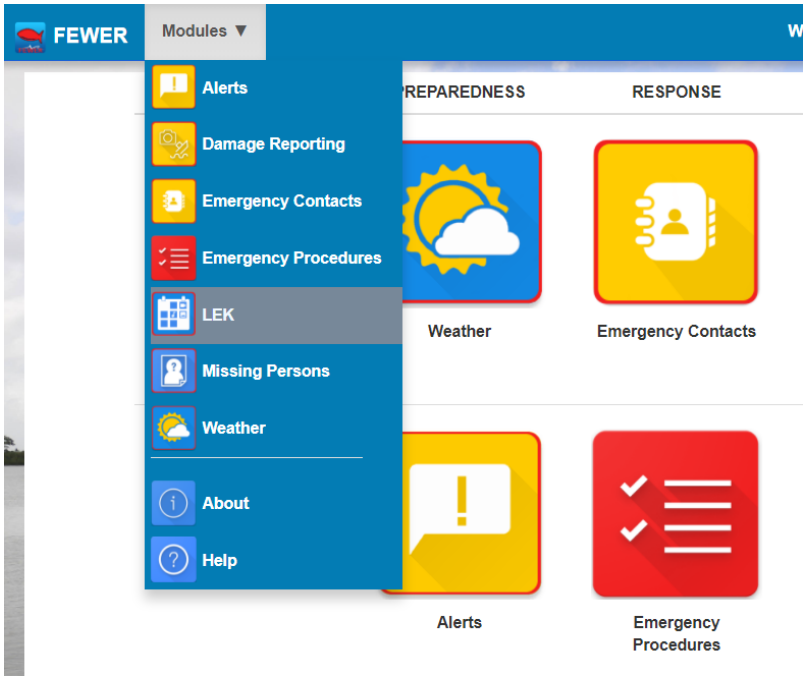


Figure 4.53 Accessing the Local Ecological Knowledge module from the FEWER main menu

FEWER's Local Ecological Knowledge dashboard displays categories on the left and entries on the right, as shown in Figure 4.54.

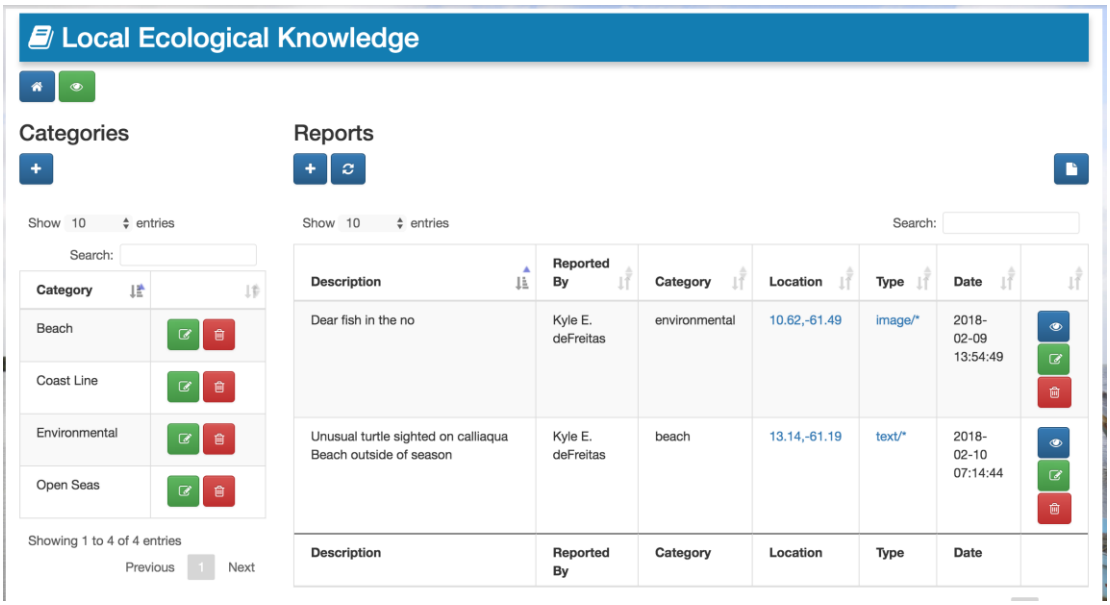
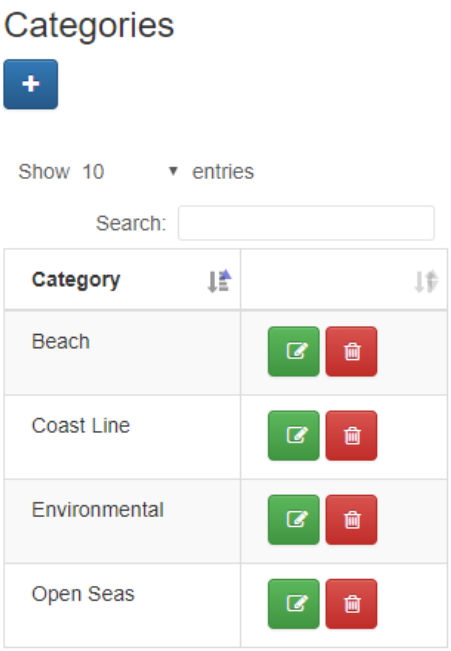


Figure 4.54 Local Ecological Knowledge dashboard showing listings and controls

4.5.2 How are LEK reports organised in FEWER? (C.A, T.A)

FEWER organises LEK reports in categories. The list of default categories and its interpretation is shown in Figure 4.55.



Category	Description
Beach	Interested events that occur upon the sandy areas close to major water bodies
Coastline	Interesting events that occur close to the shore
Environmental	A general category for events not directly related to the sea
Open Seas	Interested events that occur far from shore

Figure 4.55 Default LEK categories

4.5.3 How do I create a LEK category? (C.A., T.A)

Select the blue plus button illustrated in Figure 4.54. This will launch a window to enter the name of the new category. Figure 4.56 shows this window. Once the category is created successfully, the system will display a message asking for your acknowledgement and will confirm the success of the operation as illustrated in Figure 4.57.

Figure 4.56 Form to create a new LEK Category

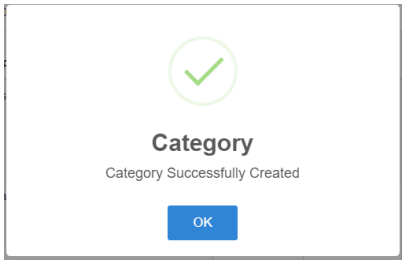


Figure 4.57 Success notification for category creation

4.5.4 How do I view LEK reports? (A.A, C.A, T.A, R.R)

The area on the right of the LEK dashboard, shown in Figure 4.54, displays the listing of LEK reports made in the host country. This area is shown on its own in Figure 4.58.

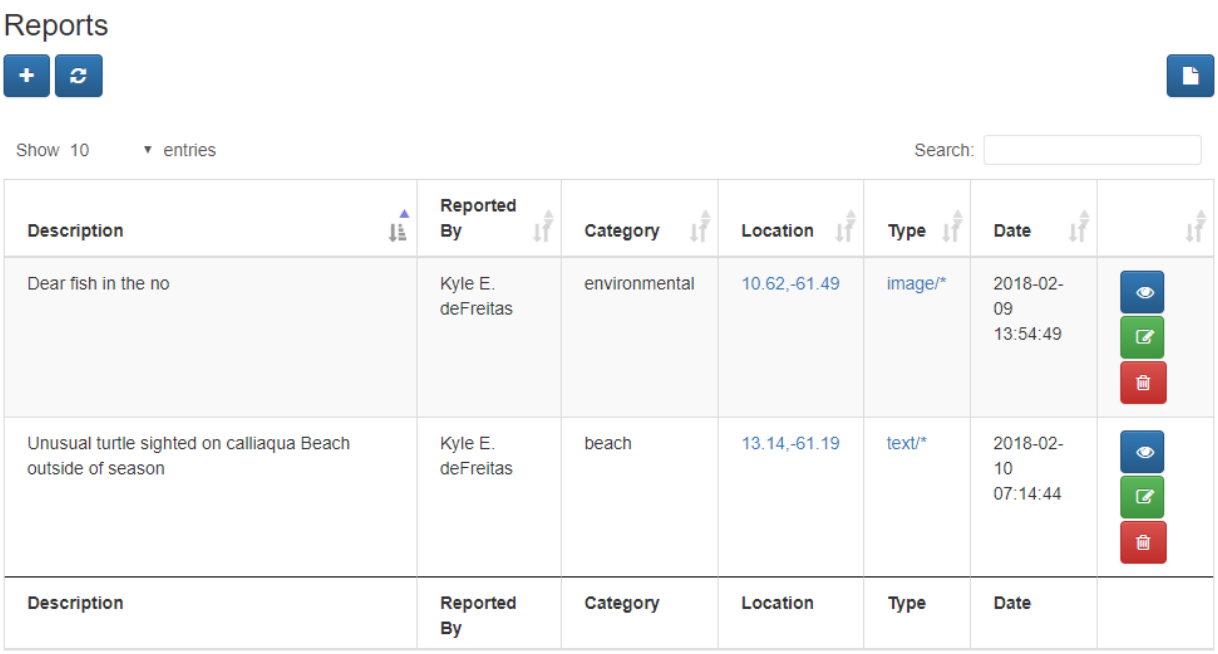


Figure 4.58 Listing of LEK reports

4.5.5 How do I create a LEK report? (A.A, C.A, T.A)

Click on the blue plus icon in the reports area (Figure 4.54) of the LEK dashboard to open a LEK report creation form, shown in Figure 4.59. The LEK report fields are summarised in Table 4.6.

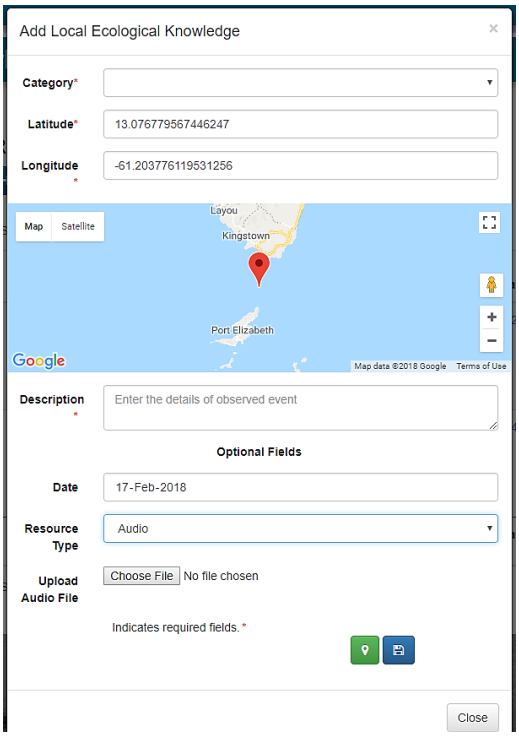


Figure 4.59 Form to create a LEK report

4.5.6 How do I delete a LEK report? (C.A., T.A)

To delete a LEK report, click on the red trash can button displayed next to the LEK report in the table displayed in Figure 4.58.

Special care must be exercised when deleting and updating records because there is no undo operation within FEWER. After the request is sent the system displays a notification message to notify whether the operation was successful.

Table 4.6 LEK Record Fields

Name	Description	Options
Title	The title an author wishes to associate with a report	Open ended text input
Category	The category of the event reported	Beach Coast line Environmental Open Seas
Latitude	Estimated or exact latitude at which event occurred	Default is automatically filled in as latitude of input device
Longitude	Estimated or exact longitude at which event occurred	Default is automatically filled in as longitude of input device
Description	Details of the event observed	Open ended text input
Date	Date damage occurred	Specification through a choice of calendar or textual date with selection controls for each field: day, month, year
Resource Type	Medium used to record evidence of the damage	Text Audio Image Video
Upload File	Upload a file that provides evidence of damage	Upload by selecting file through file explorer

4.5.7 How do I update a LEK report? (A.A, C.A, T.A)

Click on the green edit button next to a LEK report (Figure 4.58) to open the popup window to update its details shown in Figure 4.60.

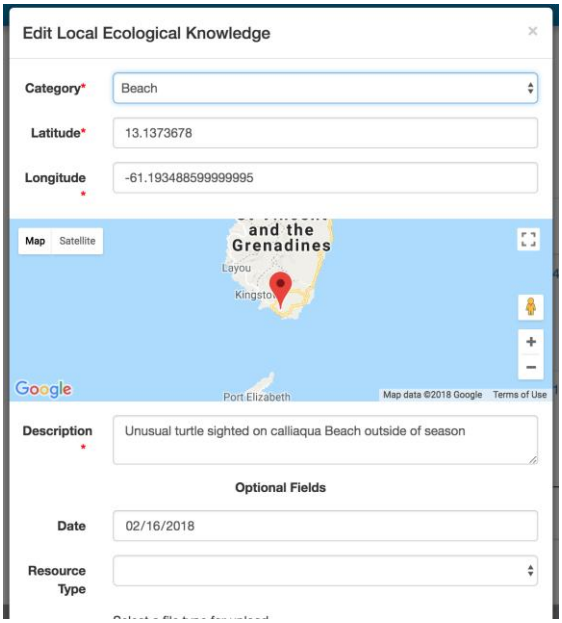


Figure 4.60 LEK Form with existing record details

Once the report is updated and save button clicked, the system will display a message asking for your acknowledgement as shown in Figure 4.61 and when operation is completed the system will display Figure 4.62.

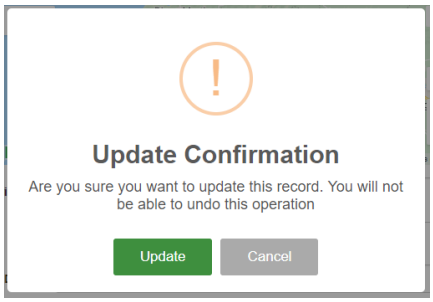


Figure 4.61 Confirmation display for updating LEK record

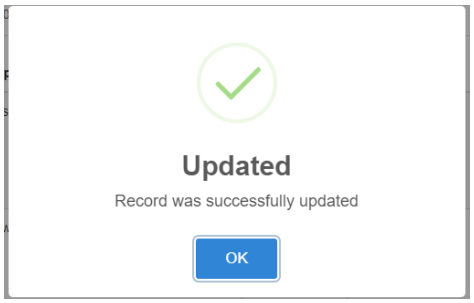


Figure 4.62 Success notification for updating record

4.5.8 How do I export an administrator report from LEK records? (A.A, C.A, T.A, R.R)

To export the records listed in LEK, we click on the blue page button in the top right corner of the LEK dashboard as shown in Figure 4.63.

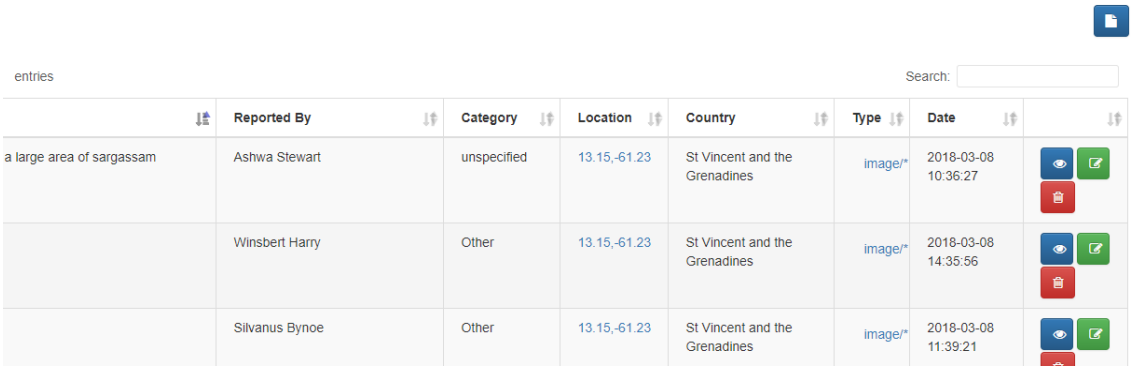
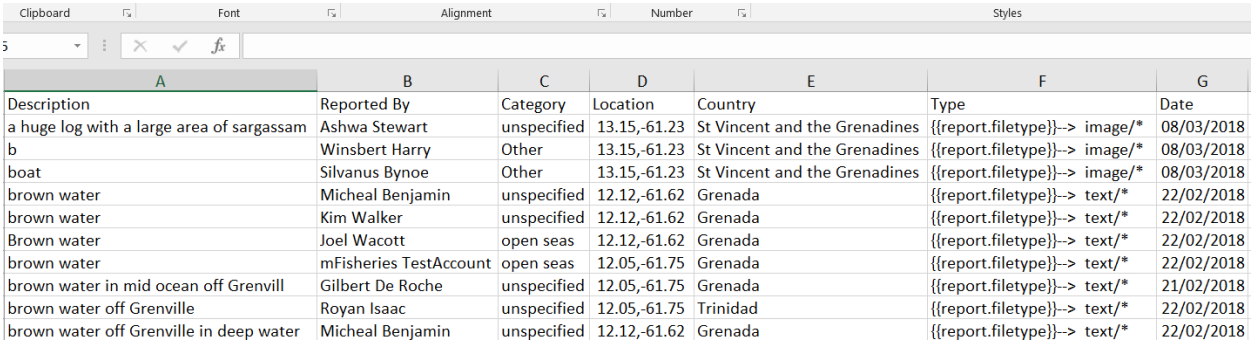


Figure 4.63 LEK Administrator report button

After the button is clicked, the system will generate a report formatted as a comma separated value (CS) file. The report contains the set of records displayed. The downloaded CSV file can be opened in Microsoft Excel to view the operations within the file. An example of the report viewed in Excel is provided in Figure 4.64.



Description	Reported By	Category	Location	Country	Type	Date
a huge log with a large area of sargassam	Ashwa Stewart	unspecified	13.15,-61.23	St Vincent and the Grenadines	{{report.filetype}}--> image/*	08/03/2018
b	Winsbert Harry	Other	13.15,-61.23	St Vincent and the Grenadines	{{report.filetype}}--> image/*	08/03/2018
boat	Silvanus Bynoe	Other	13.15,-61.23	St Vincent and the Grenadines	{{report.filetype}}--> image/*	08/03/2018
brown water	Micheal Benjamin	unspecified	12.12,-61.62	Grenada	{{report.filetype}}--> text/*	22/02/2018
brown water	Kim Walker	unspecified	12.12,-61.62	Grenada	{{report.filetype}}--> text/*	22/02/2018
Brown water	Joel Wacott	open seas	12.12,-61.62	Grenada	{{report.filetype}}--> text/*	22/02/2018
brown water	mFisheries TestAccount	open seas	12.05,-61.75	Grenada	{{report.filetype}}--> text/*	22/02/2018
brown water in mid ocean off Grenvill	Gilbert De Roche	unspecified	12.05,-61.75	Grenada	{{report.filetype}}--> text/*	21/02/2018
brown water off Grenville	Royan Isaac	unspecified	12.05,-61.75	Trinidad	{{report.filetype}}--> text/*	22/02/2018
brown water off Grenville in deep water	Micheal Benjamin	unspecified	12.12,-61.62	Grenada	{{report.filetype}}--> text/*	22/02/2018

Figure 4.64 Example of an administrator report using LEK records

4.6 Missing Persons

4.6.1 How do I access the Missing Persons Module? (A.A, C.A, C.G, T.A, R.R)

After logging in to the FEWER administrators' dashboard using the credentials provided, click the FEWER option in the menu and select the Missing Persons option from the list as shown in Figure 4.65.

Figure 4.65 Accessing Missing Person Module from the Menu

4.6.2 How do I view Missing Persons from my country? (A.A, C.A, C.G, T.A, R.R)

After selecting the Missing Persons module from the FEWER menu, the dashboard displays the listing of missing persons in a table. The list is sorted in order of creation date, with the most recently created appearing first, as illustrated in Figure 4.66.

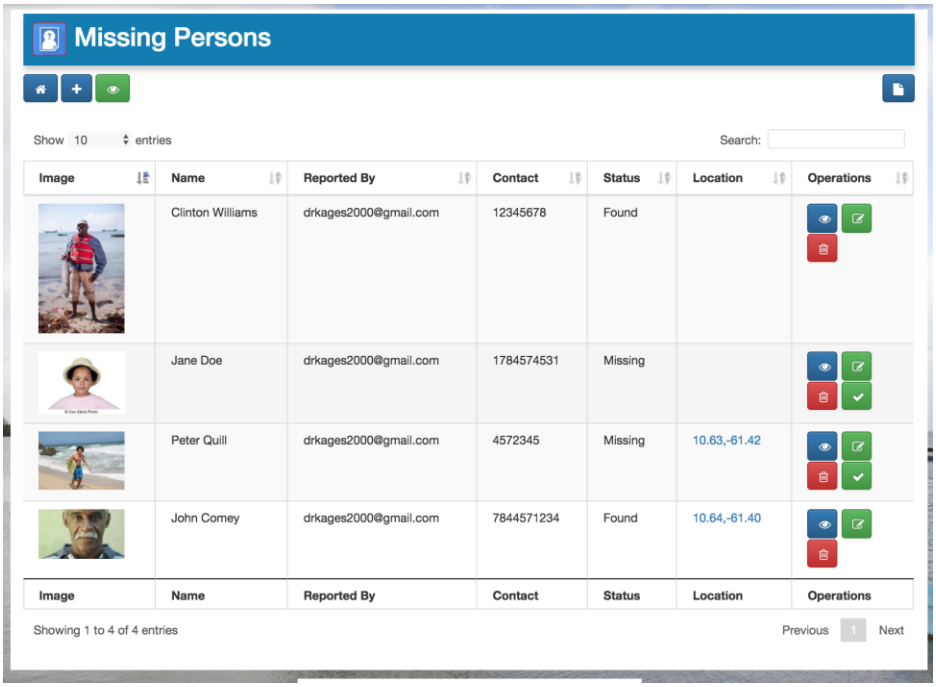


Figure 4.66 Viewing Missing Persons

4.6.3 How do I create a Missing Person's report? (A.A, C.A, C.G, T.A)

In the Missing Persons dashboard, click the plus icon to launch the popup window to create a new missing person's report. The button can be seen in Figure 4.67. Fill in the new report window, shown in Figure 4.68.

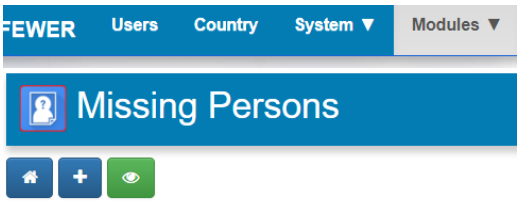


Figure 4.67 Button to add Missing Person report

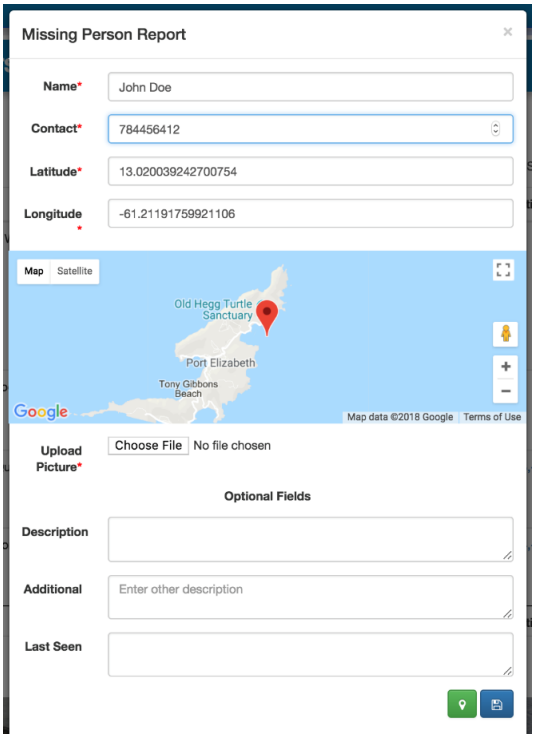


Figure 4.68 Missing Person report form

The fields are elaborated in Table 4.7. Once the operation is successful, the system notifies the user.

Table 4.7 Missing Person report fields

Name	Description	Particulars
Description	Description of the physical characteristics of the person	Optional
Contact	Contact information for person reporting	Required
Latitude	GPS reading for person making report	Automatically provided by app
Longitude	GPS reading for person making report	
Additional	Suggestions include contact info for the missing person and the area last seen or last known bearing	Optional

4.6.4 How do I mark a person as missing and found? (A.A, C.A, C.G, T.A)

The administrator can mark a person as missing. In the listing page, the status of the report is displayed in the “status” column. If the report’s status is missing, the record has an additional option to mark the report as found. This “mark as found” icon is indicated as a green button with a tick as shown in Figure 4.69.

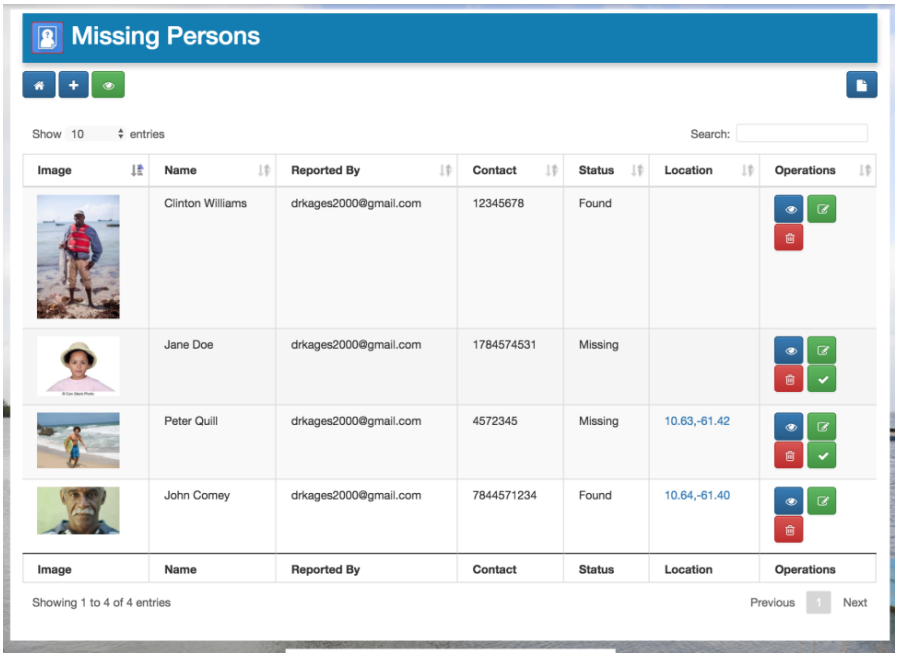


Figure 4.69 Missing Person report listing

If you press the green “mark as found” button, the system will display a prompt for you to confirm the operation. If the operation is successful, then the system will display a confirmation to the user.

4.6.5 How can I remove a missing person report? (A.A, C.A, C.G, T.A)

Navigate to the missing persons module to see the list of reports. The dashboard provides several operations that can be performed on each entry. These are available through icons that appear in the right-most column of the record.

The set of operations includes delete. This is accessed through the red trash can icon. Clicking the red delete button of the record, will display a message for you to confirm that you would like to delete the record.

Special care must be exercised when deleting and updating records because there is no undo operation within FEWER. After the request is sent the system displays a notification message. Prompts are presented for operation failure and success.

4.6.6 How do I export an administrator report from Missing Persons records? (A.A, C.A, C.G, T.A, R.R)

To export the records listed in Missing Persons, we click on the blue page button in the top right corner of the Missing Persons dashboard as shown in Figure 4.70.

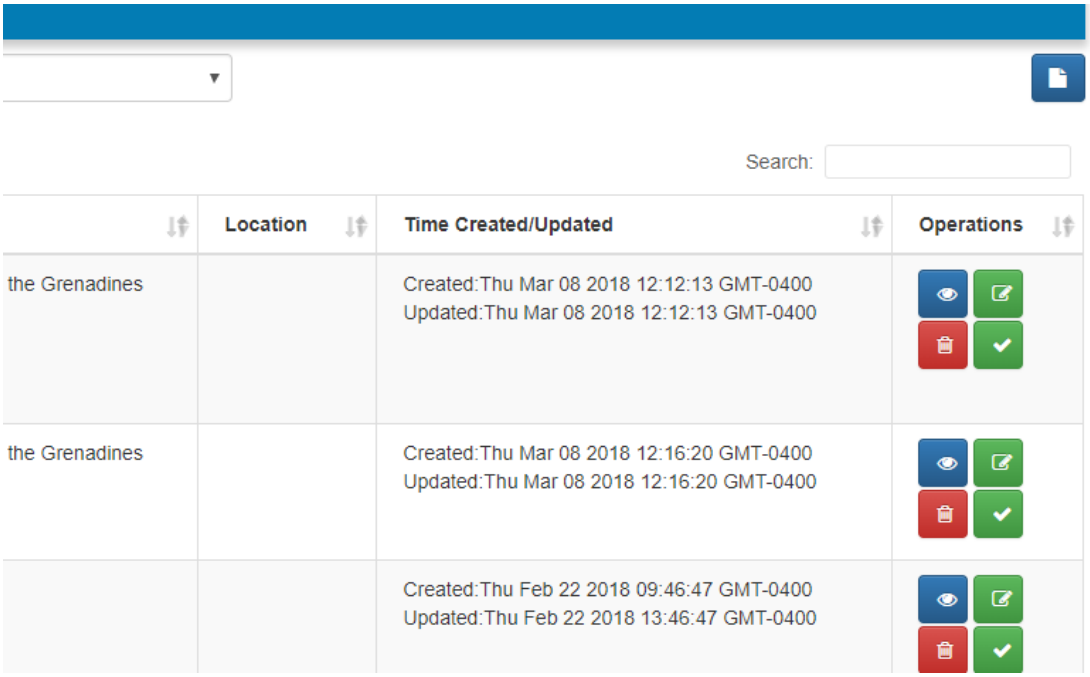


Figure 4.70 Missing Persons Administrator report button

After the button is clicked, the system will generate a report formatted as a comma separated value (CS) file. The report contains the set of records displayed. The downloaded CSV file can be opened in Microsoft Excel to view the operations within the file. An example of the report viewed in Excel is provided in Figure 4.71.

A	B	C	D	E	F	
Name	Reported By	Contact	Status	Country	Location	Time Created/Updated
short man	mrgoodstufpaul360@gmail.com	1784 53266	Missing	St Vincent and the Grenadines		Created:Thu Mar 08 2018
short boy	garsonbynoe@gmail.com	4561126	Missing	St Vincent and the Grenadines		Created:Thu Mar 08 2018
Sean smith	michealbenjamin27@gmail.com	7654321	Missing	Grenada		Created:Thu Feb 22 2018 0
Peter Quill	drkages2000@gmail.com	4572345	Missing	St Vincent and the Grenadines	10.63,-61.	Created:Mon Jan 08 2018
paul	winsberthazlewood@gmail.com	4587632	Missing	St Vincent and the Grenadines		Created:Thu Mar 08 2018
missing person	trevorepiphane@gmail.com	7163711	Missing	Saint Lucia		Created:Thu Mar 01 2018 0
Missing Captain Of the boat	drkages2000@gmail.com	1234567	Missing	Dominica		Created:Mon Nov 13 2017
Missing Captain	drkages2000@gmail.com	1234567	Missing	Trinidad		Created:Mon Nov 13 2017
Micheal Holdings	drkages2000@gmail.com	4574123	Missing	Saint Lucia	10.63,-61.	Created:Mon Jan 08 2018
labstar	lindonmarrast1337@gmail.com	4183644	Missing	Grenada		Created:Thu Feb 22 2018 1

Figure 4.71 Example of an administrator report using Missing Persons records

4.7 Weather

4.7.1 How do I access the Weather module? (A.A, C.A, C.G, T.A, R.R)

After logging in, click the FEWER drop down in the main menu and select the Weather option from the list, as shown in Figure 4.72.

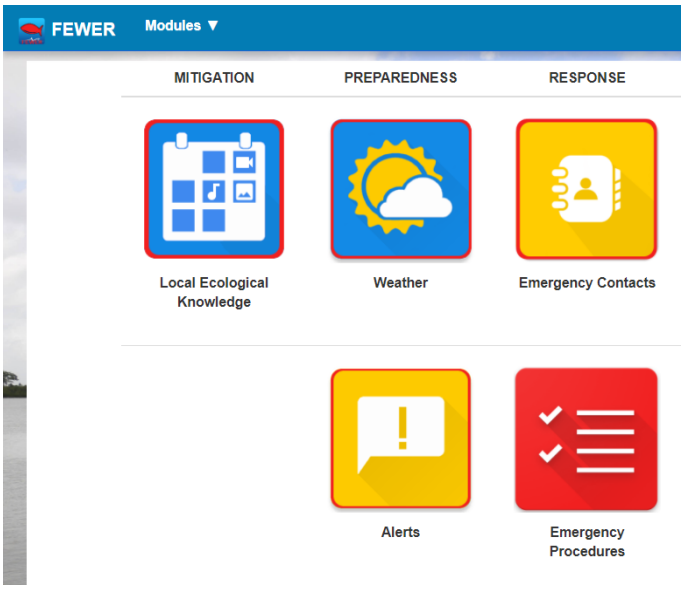


Figure 4.72 Accessing Weather Module from the menu

When the Weather module is selected, the Weather dashboard is displayed. The dashboard comprises a table of weather source entries as shown in Figure 4.73.

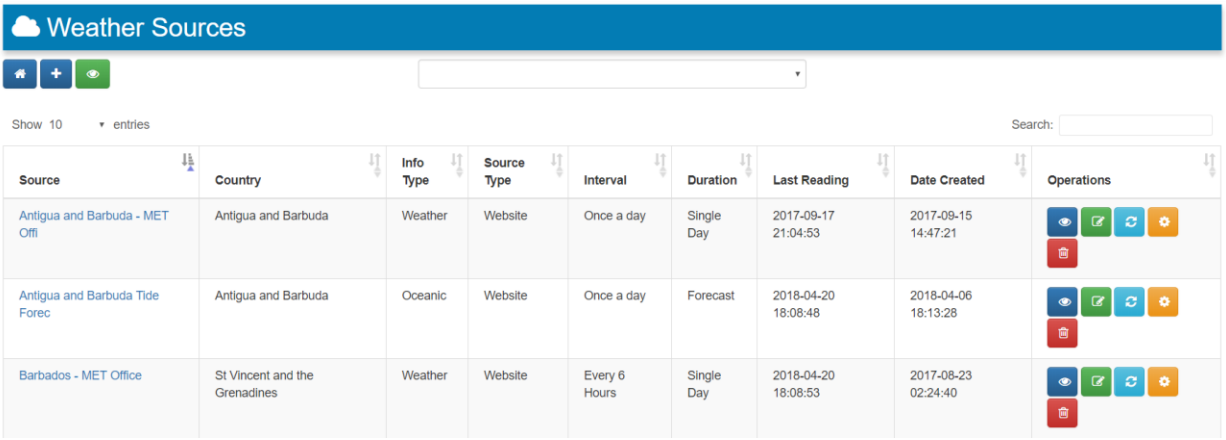


Figure 4.73 Weather Source listing

4.7.2 What are weather sources?

In FEWER a weather source refers to an official organisation from which hydro meteorological (hydro-met) data is retrieved. This includes the local MET services and third party organisations such as OpenWeatherMap and Accuweather.

4.7.3 What are extractors?

Extractors are files that are run within the FEWER system to retrieve hydro-met data from a specific weather source. These files can be set to run on a schedule or manually at any time by an administrator. For example, the extractor will parse the websites of the Met Office in Saint Lucia to retrieve the relevant daily weather readings. Further details on the extractors are provided in the Appendix.

4.7.4 What are thresholds?

In the context of the FEWER Weather module, a threshold is a value set for a specific weather parameter that determines if the current value meets warning or emergency criteria. The threshold values are specified by the Met office in each FEWER country and configured by the country or agency administrators for that country.

4.7.5 How do I view weather sources available for my country? (A.A, C.A, R.R)

The weather dashboard displays the list of sources as shown in Figure 4.74. Each entry indicates the country, type of information, format of data electronically accessed from the source, update periodicity (interval), temporal scope (duration), most recent reading and creation date. As for all FEWER administrator dashboards, icons for available management options are displayed.

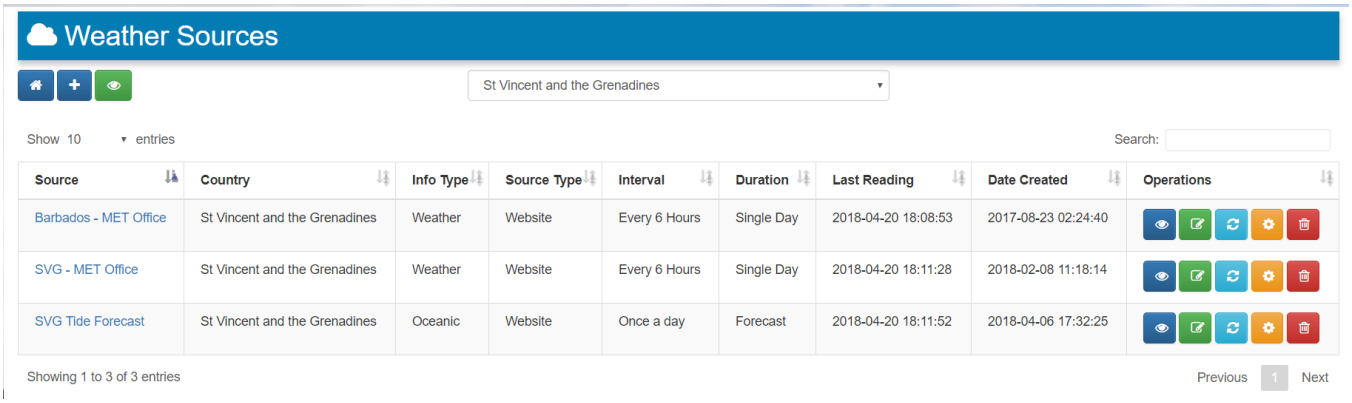


Figure 4.74 Weather Source listing

4.7.6 How do I view the details of a weather source? (A.A, C.A, R.R)

To view the details of a weather source, go to the weather dashboard. Click on the weather source of choice to display details as shown in Figure 4.75 for Dominica Met office.

Figure 4.75 Example Weather Source details in listing

4.7.7 How do I view the readings captured by a weather source? (A.A, C.A, R.R)

To view weather readings, click the green eye icon in the table on the weather dashboard. This will display readings captured by a weather source, as shown in Figure 4.76.

4.7.8 How do I create a new weather source? (A.A, C.A)

To create a new weather source, click on the blue plus icon on the weather sources page. This will display a form to configure the weather source details as shown in Figure 4.77. The fields are elaborated in Table 4.8.

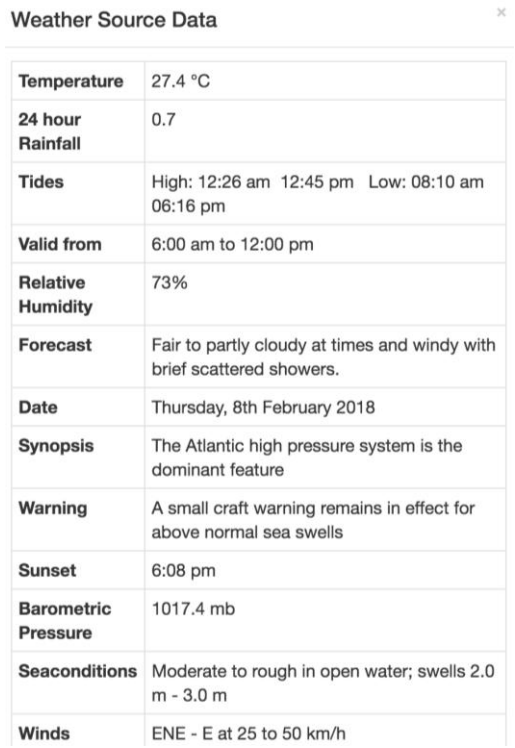


Figure 4.76 Weather Source readings

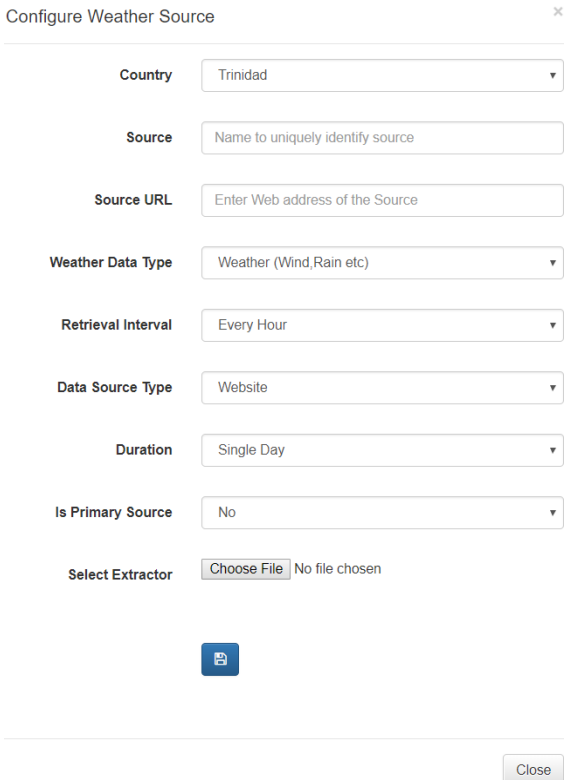


Figure 4.77 Configure Weather Source window

Table 4.8 Configure Weather Source Options

Name	Description	Options
Source	Name to uniquely identify a local (Met office etc.) or external (NOAA, OpenWeather etc.) source of weather information	Open-ended text entry by administrator for FEWER in a particular country
Source URL	Web address through which the data is accessible from the named weather source	Open-ended text entry
Weather Data Type	Primary type of data provided by the source	1. Oceanic: tides etc. 2. Weather: wind, rain etc.
Retrieval Interval	Period over which data is updated	1. Every Hour 2. Every six Hours 3. Once per day
Data Source Type	Means through which FEWER accesses the weather data from the named source	1. Website 2. Application Programming Interface (API)

Name	Description	Options
Duration	Period over which the weather data is valid	1. Single Day 2. Forecast
Is Primary Source	Primary source of information to be used for weather alerts	1. No 2. Yes
Select Extractor	Extractor file to be used to programmatically extract data from source	Upload by selecting extractor through file explorer

4.7.9 How do I edit an existing weather source? (A.A, C.A)

Clicking on the light blue edit icon on a weather source listing opens a window to edit the information of the current weather source shown in Figure 4.77.

4.7.10 How do I upload an extractor? (A.A, C.A)

Extractors are used to retrieve weather information for each source as explained in section 4.7.3. To upload an extractor when adding or updating a weather source, click on the "Choose File" button as shown in Figure 4.77 This opens a file explorer window to select the extractor file from the administrator's computer to upload and associate with the weather source.

4.7.11 How do I specify thresholds? (A.A, C.A)

When an extractor file is uploaded, the form in a popup window shown in Figure 4.78 is displayed. The threshold values for the uploaded extractor must be set here.

This popup window can also be opened by clicking on the orange gear icon, shown in Figure 4.79, of an existing weather source. Each extractor has different values that can be configured, so the form displayed will differ for each extractor.

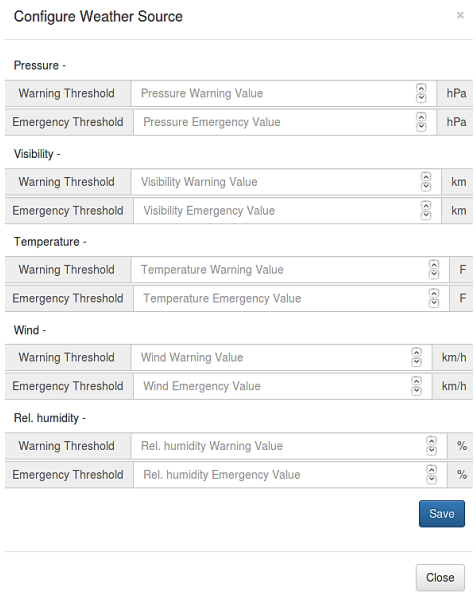
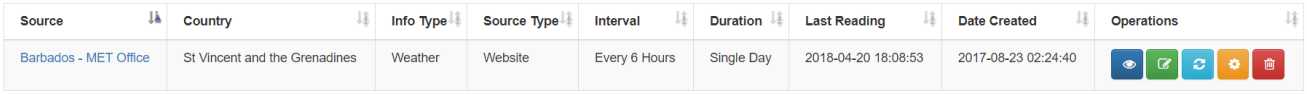


Figure 4.78 Set thresholds window

4.7.12 How do I manually update the weather information from the source? (A.A, C.A)

To manually update a weather source, click the dark blue refresh icon,  ,to update the weather information from the weather source. See Figure 4.79.



Source	Country	Info Type	Source Type	Interval	Duration	Last Reading	Date Created	Operations
Barbados - MET Office	St Vincent and the Grenadines	Weather	Website	Every 6 Hours	Single Day	2018-04-20 18:08:53	2017-08-23 02:24:40	

Figure 4.79 Weather Source operations

The system will display a confirmation when the update operation is completed successfully.

4.7.13 How do I view weather details from another country? (A.A, C.A, R.R)

To view weather details from another country, click on the green eye icon next to the blue plus icon in the upper left corner of the window. See Figure 4.80.

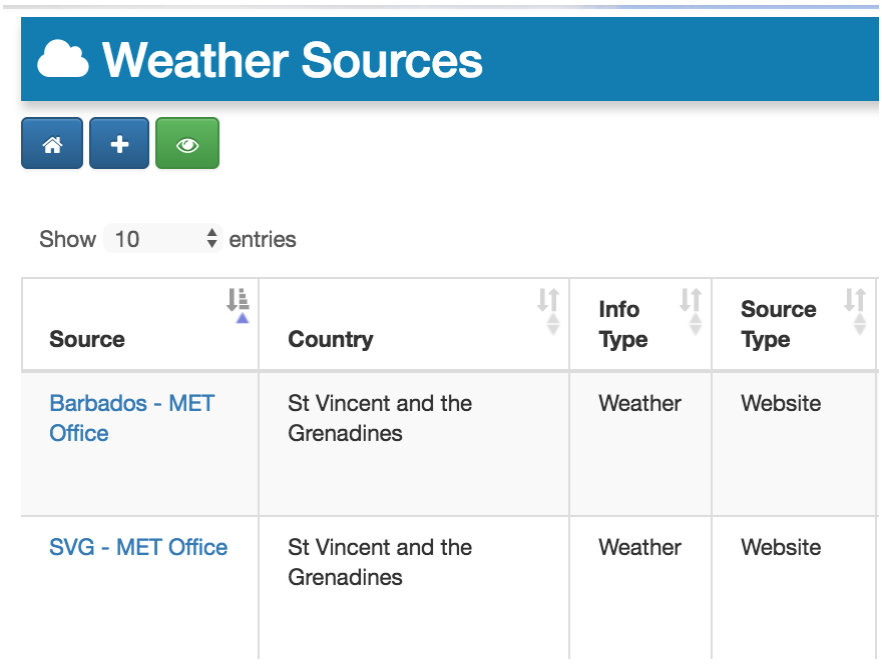


Figure 4.80 Weather Source listing

This opens the Weather Report page. Select the country of interest to display the details as shown in Figure 4.81. On this page weather information from the Open Weather Map and MET-Office is displayed as shown in Figure 4.82. The page alternates between the two every twenty seconds.

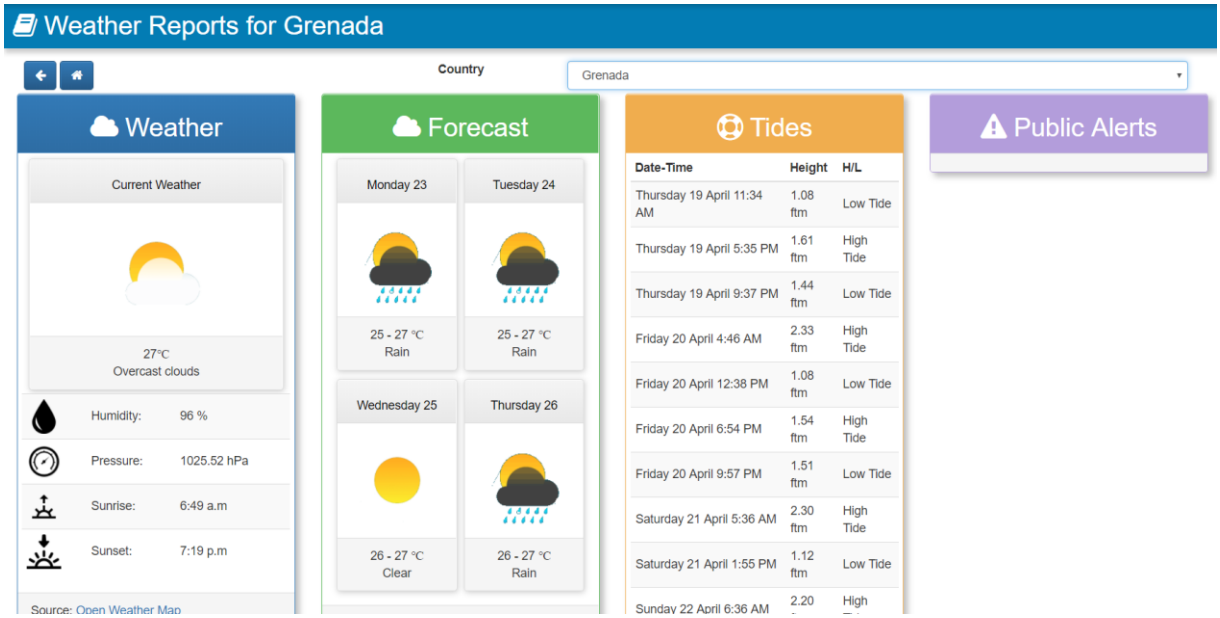


Figure 4.81 View Weather Report for a country

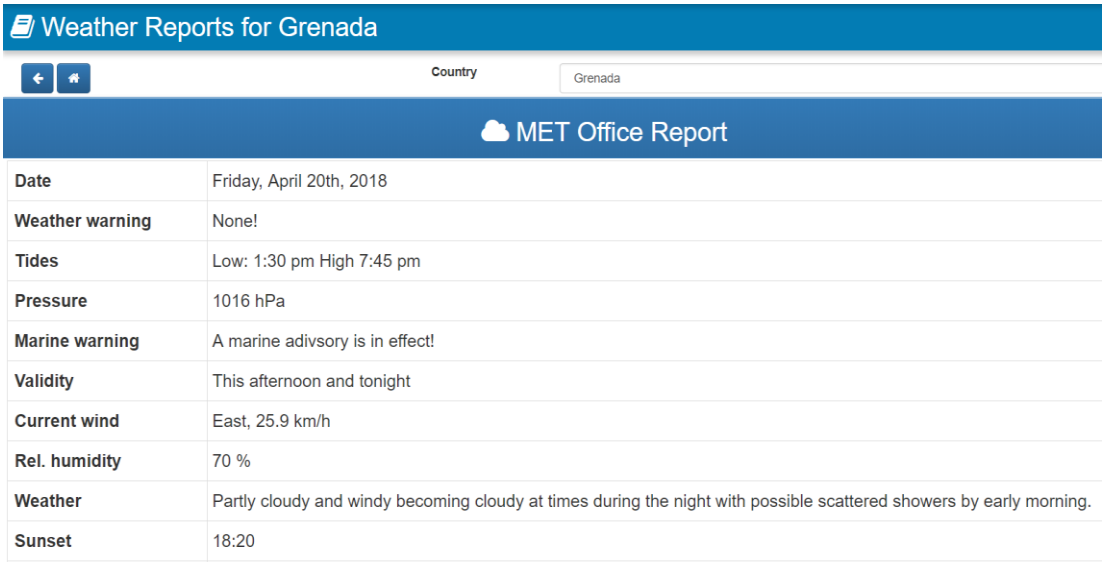


Figure 4.82 Details for Weather Report for a country

4.7.14 How do I create or modify extractors? (T.A)

Extractors require knowledge of the python programming language and compose of a set of variables and functions that determine where the information is retrieved from and how it is retrieved. To create an extractor, it must inherit from the "WeatherSourceExtractor" class.

An Extractor file contains a python class called "WeatherSourceExtractor" which provides the structure for the creation of extractors. Inheriting the WeatherSourceExtractor class ensures that the programmer adheres to the extractor file's structure. The most important method is the **extract()** method. The new extractor must implement this in such a way that the extract returns the dictionary of extracted readings from the weather source's URL. The **extract** method is the one that would be edited to modify an extractor. An example of an extractor file is shown in Figure 4.83. Further information about the representation of an extractor can be found in the extractor manual highlighted in the Appendix.

```
try:
    # We are attempting to run via cli within mFisheries application
    from mfisheries.modules.weather.parsers.WeatherSourceExtractor import WeatherSourceExtractor
except:
    # We are attempting to run via cli outside of application
    from WeatherSourceExtractor import WeatherSourceExtractor

class Extractor(WeatherSourceExtractor):
    def __init__(self):
        WeatherSourceExtractor.__init__(
            self,
            "http://meteo.gov.vc/meteo/",

        )

    def get_poster_url(self):
        return self.post_url

    def get_extractor_url(self):
        return self.extractor_url

    def get_reading_types(self):
        return {
            "wind": {
                "type": "text",
                "unit": "km/h"
            },
            "seas": {
                "type": "text",
                "unit": "m"
            }
        }

    def extract(self):
        headings = []
        self.readings = {}
        print("Extracting current info from Saint Vincent MET")
        r = requests.get(self.extractor_url)
        print("Retrieved home page")
        soup = BeautifulSoup(r.content, "html.parser")
        data = soup.find_all("ul")
            save =""
```

Figure 4.83 Extractor File Example

4.8 mFisheries tasks

As FEWER is built on the mFisheries framework, certain services related to FEWER but not falling directly within FEWER may be accessible. These include tracking and SOS.

4.8.1 Tracking (C.A, T.A, C.G)

4.8.1.1 How do I access the Tracks dashboard? (C.A, T.A, C.G)

After logging in you are taken directly to the Tracks dashboard. You can also click on the Tracks option in the menu bar to the top to be taken to the Tracks dashboard. The dashboard is shown in Figure 4.84 below.

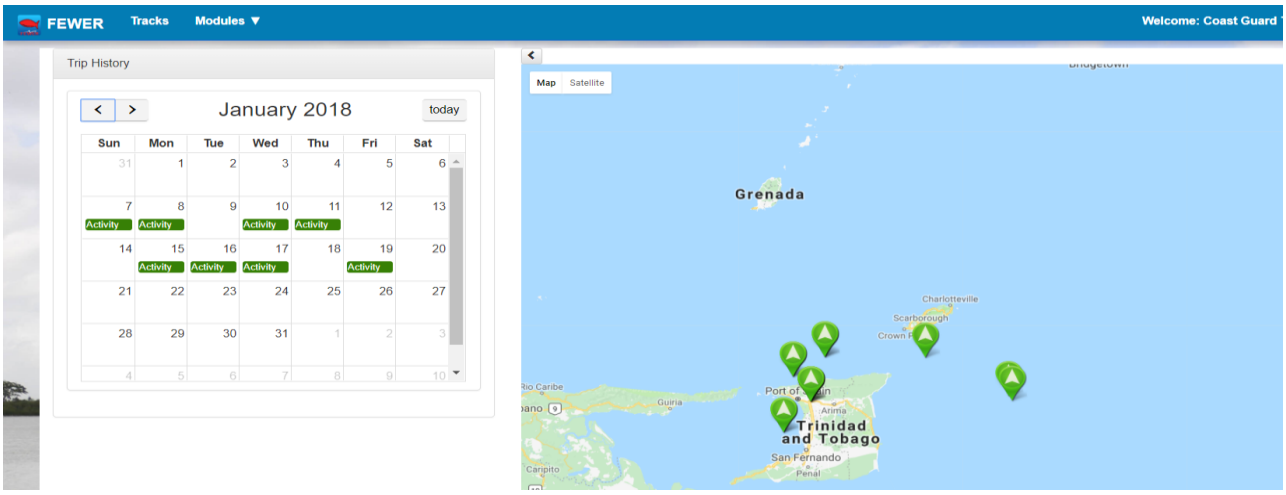


Figure 4.84 Coast Guard Dashboard

4.8.1.2 How can I check tracking data for different days or months? (C.A, T.A, C.G)

To check the tracking data for a different day by clicking the date on the calendar in the top left corner of the dashboard. To change the month displayed, click the arrows next to the month to change it shown in Figure 4.85.

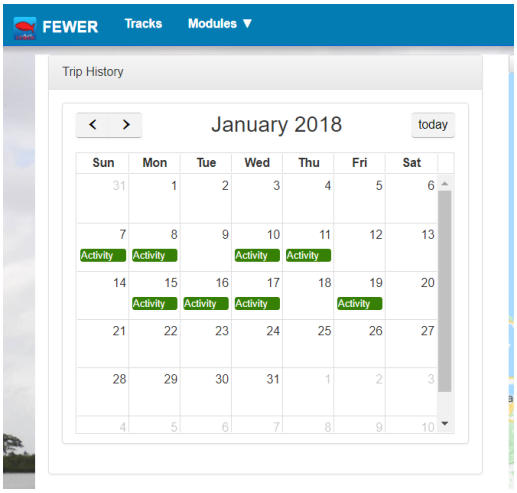


Figure 4.85 Date controls for tracks page

4.8.1.3 How can I see more details about a tracking pin? (C.A, T.A, C.G)

To see more details about a tracking pin, click on the pin on the map this will open a small window displaying more information about the pin as shown in Figure 4.86. Clicking on the "All tracks" button will display all tracks related to that pin seen in Figure 4.87.

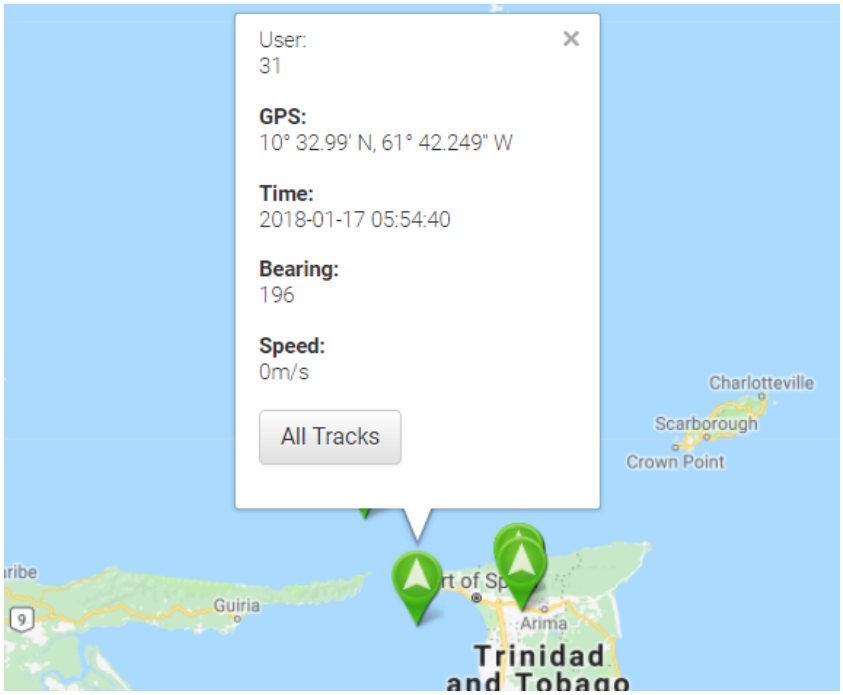


Figure 4.86 Displaying more information for a tracking pin

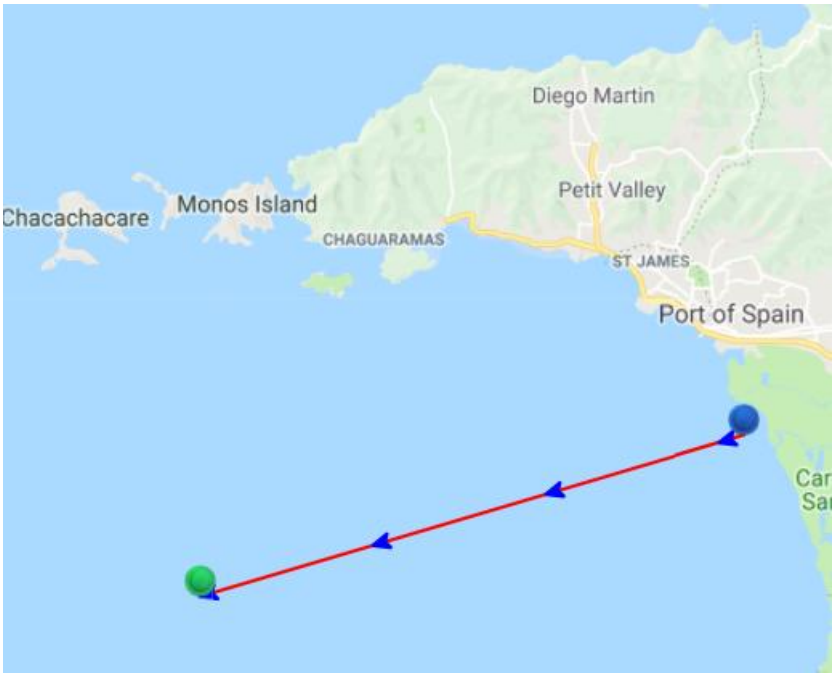


Figure 4.87 Displaying all tracks for a pin

4.8.2 SOS (C.G)

SOS alerts are sent to the system from users who report that they are in distress while using the application. These alerts are displayed in the tracking screen of the Coast Guard interface as red pins with orange exclamation mark as show in Figure 4.88. The SOS pins are interactable the same way as regular tracking pins but have an additional option to resolve the SOS.

Figure 4.88 SOS tracking pin on map

4.8.2.1 How do I resolve an SOS? (C.G)

To resolve an SOS, click on the red SOS tracking pin. This will open a menu with more information on the SOS pin as seen in Figure 4.89.

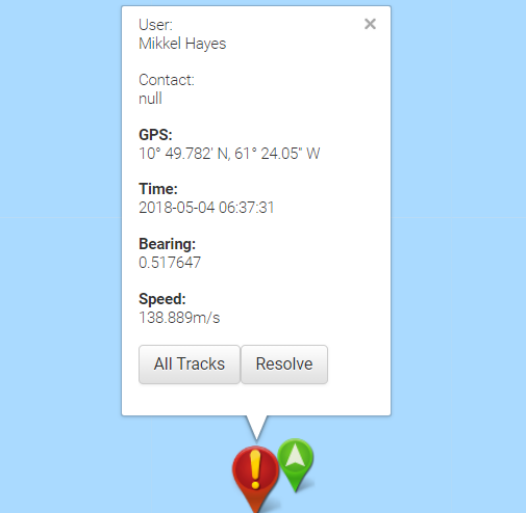


Figure 4.89 SOS pin contextual menu

Clicking the "Resolve" button will bring up a window to fill out the relevant information of the SOS; this can be seen in Figure 4.90. When the save button is clicked a confirmation message will be displayed and the SOS will be resolved.

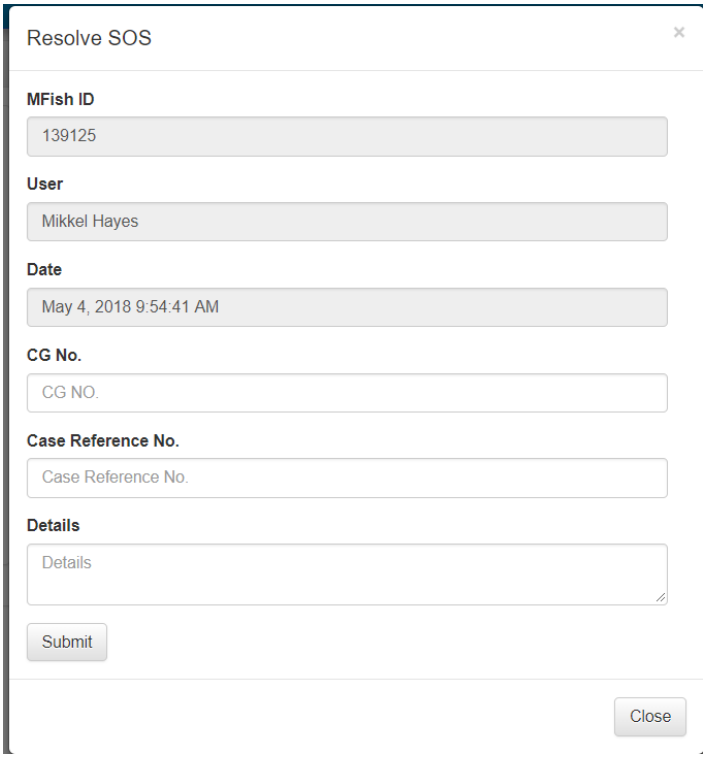


Figure 4.90 SOS resolution form

5. Country-specific FEWER Configuration

FEWER operation requires the configuration of several parameters that are not specific to any module. These configurations apply to the FEWER country-instance and its users.

5.1 Country Configuration

Country administrators configure FEWER installations for their home country. Configurations include the representative GPS locations of the countries as well as their country listing, area codes and ISO codes. They are also required for data, email and user management.

5.1.1 Where do I set the country configurations? (C.A, T.A)

To set the country configurations, select the "Country" option in the top menu. From here the different configurations can be modified by selecting the green edit button next to the configuration.

5.1.2 What can I configure in the country listing? (C.A, T.A)

In the Country Listing you can modify the name of your home country as well as the Area and ISO codes for your home country. To do this click on the green edit button next to the country listing which will bring up a form to change Country name, Area code and ISO code. When the changes are made, click the blue save button to complete the changes.

5.1.3 What does configuring the country name in the country listing do? (C.A, T.A)

Configuring the name of your home country sets its appearance throughout the FEWER system on both the mobile and web applications. For example, if your home country is Saint Lucia, you may configure it to “Saint Lucia” or “St. Lucia” and it will appear this way to all FEWER users, within and outside of the country. Each country administrator configures his or her own country in the listing:

- Dominica
- Grenada
- Saint Lucia
- St. Vincent and the Grenadines
-

5.1.4 How are Country ISO Codes used in FEWER? (C.A, T.A)

The Country ISO codes are used to create the folders for each country within the application:

- Dominica: dma
- Grenada: grd
- Saint Lucia: lca
- St. Vincent and the Grenadines: vct

5.1.5 How are Country Locations used in FEWER? (C.A, T.A)

The country locations provide a rough estimate of location to determine weather conditions when a GPS signal is not available to the application:

- Dominica: (15.414999, -61.370976)
- Grenada: (12.262776, -61.604171)
- Saint Lucia: (13.909444, -60.978893)
- St. Vincent and the Grenadines: (12.984305, -61.287228)

5.1.6 Where are Country Area Codes used in FEWER? (C.A, T.A)

The country area codes are used in Emergency Contacts. They are automatically inserted as a prefix to the local phone number if not otherwise specified:

- Dominica: 767
- Grenada: 473
- Saint Lucia: 768
- St. Vincent and the Grenadines: 784

The system will automatically format the entered 3-digit area code to be used for calling contacts across different territories.

5.2 User Management

Country and technical administrators have access to the user management dashboard of the web system. Here users can be added, removed and modified. User passwords can also be changed.

5.2.1 Where can I access the controls to manage user information? (C.A, T.A)

This control can be accessed from the Users option in the main menu and displays as shown in Figure 5.1.

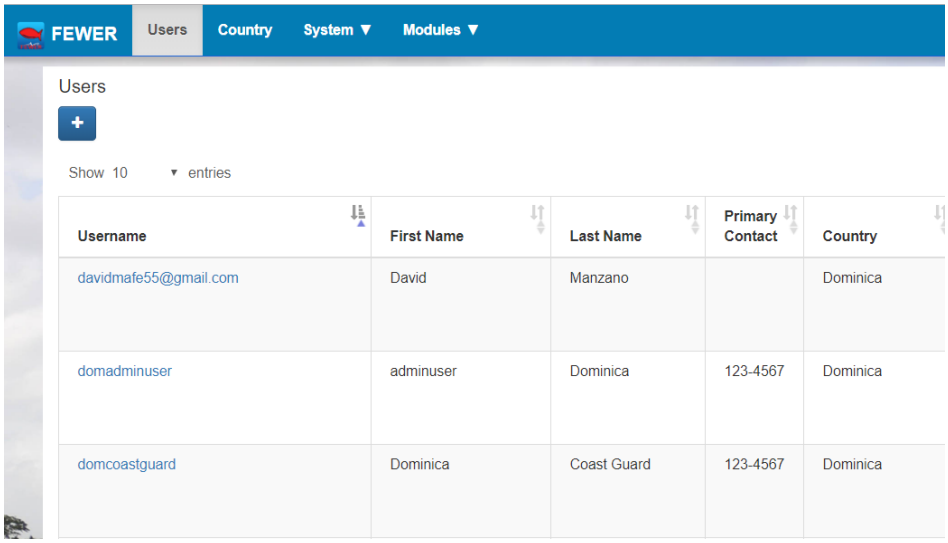


Figure 5.1 User Configuration Dashboard

5.2.2 How do I change a user's password? (C.A, T.A)

To change a user's password from the user management dashboard, we select the blue key icon in the controls column next to a user record as shown in Figure 5.2. The options highlighted are part of each record displayed in the list of users displayed in Figure 5.1.

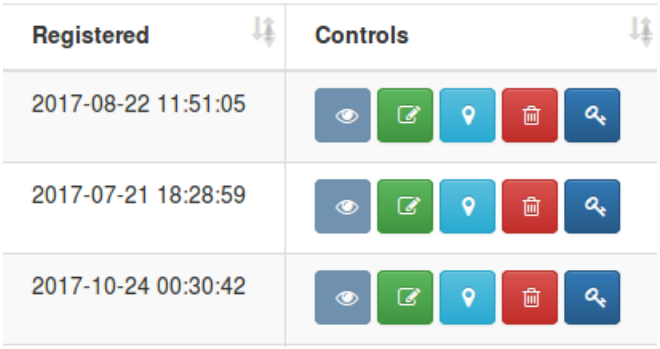


Figure 5.2 User management controls

When the "change password" button (blue key button) is clicked, the popup window to update the password is displayed. This form is displayed in Figure 5.3. To change the password, the user enters the users' new password twice and clicks the blue save button. The system will display a confirmation message when operation is completed.

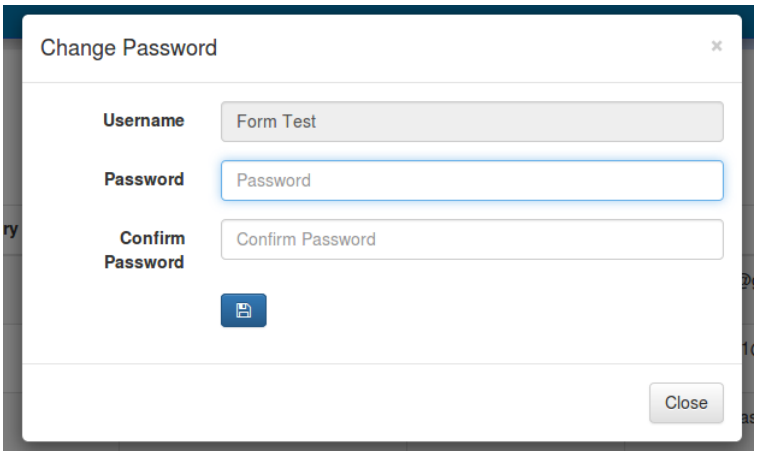


Figure 5.3 Change Password Form

6. System Installation and Configuration

6.1 Overview

FEWER consists of four main components:

1. An Android-based mobile application
2. A REST-based web services
3. A JavaScript-based web application
4. 3rd party services

These components interact with each other to perform the various functions of the overall system. The installation and configuration of the system are discussed in the following sections.

6.2 Technologies

Installation of the REST-based web services and the JavaScript-based web application requires the technologies highlighted in Table 6.1.

Table 6.1 Technologies for FEWER REST Web Services and Web Application

Software	Version	Purpose
CentOS	7	CentOS is the Linux-based operating system used to host the application. CentOS is a popular choice for enterprise-grade Linux solutions. The system is not specifically tied to CentOS and can be used with any Linux-based OS.
PHPMyAdmin	> 4.0	PHPMyAdmin provides a GUI tool for configuring MySQL databases. The system is not dependent on this software, but it makes the initial configuration of databases easier during installation and future maintenance.
MySQL	5.6	The MySQL database is a relational database used to store all the data required and generated by the platform. The system was successfully tested on v5.1 and is compatible with later versions of MySQL. The system is tied to MySQL, and another database cannot be easily substituted.
Apache HTTP Server	> 2.2	The Apache HTTP server facilitates the serving of dynamic web content over the internet. The Apache server makes it easier to map the application to a desired path of the server. Apache makes it easy for the system to run the application in parallel to existing applications in the system. The system is not tied specifically to Apache, and other HTTP servers can be used (such as Nginx or IIS).
Python	2.7	Python is the programming language used to develop the application. The application was developed using 2.7 because of the wider availability of support and packages needed to develop the functionality required. The system was not tested with Python 3.0, so running it in this environment is not recommended.

Software	Version	Purpose
Git	> 2.17	Git is code management tool used to manage the code distributed in the system. The system is not tied to git and can be managed and maintained without it.
NodeJS	> 10.1	Several configurations and front-end packages are developed with JavaScript libraries. NodeJS is used within the installation process of the application. It is not used in the daily execution of the software system.
Bower	1.8.4	Several front-end packages are managed by Bower. Bower is used to download all the related JS and CSS libraries. Bower is used within the installation process of the application. It is not used in the daily execution of the software system.
Pip	10	Pip is a package management system used to install and manage python software packages. The package manager makes it easier to ensure that the system has the tools and dependencies needed for its successful configuration. Pip handles the actual installation and dependencies for the components used by the system. It is not used in the daily execution of the software system.

Installing the Android-based mobile application requires the technologies highlighted in Table 6.2.

Table 6.2 Technologies for FEWER Android-based Mobile Application

Software	Version	Purpose
Android SDK Build Tools	27.0.3	The build tools are used to convert and package the programming code into the executable form of that will be deployed on the supported Android devices.
Android SDK Platform	27	The Android API defines what version of Android the system is developed. The latest version of the platform SDK that the system was developed is 27.
Android Studio	3.1.2	The Android Studio IDE is used to manage the process of building Android applications. It supports various tasks from writing programming code to manage the build process for application deployment.
Gradle	3.2.0	Gradle is used by the Android SDK tools and Android Studio to run and build the applications
Java (JDK)	> 8	The Java Developer Toolkit (JDK) version 8 was used on the operating system that developed the application. No version 8 specific or deprecated features were utilised, therefore upgrade to later versions should not cause problems.

The following subsections describe in detail the procedure for installing and managing the application components of FEWER. While this document provides step by step instructions for installation, further instructions can be found in the FEWER git repository for the web and mobile applications to configure these components. Some sections of the document provide external links to provide additional detail for the steps highlighted in the manual.

6.3 The Configuration of REST-based Web Services

Setting up the REST-based web services will require the configuration of several components. These are:

- The platform (machine) server
- The HTTP server
- The Database Management System (DBMS)
- The FEWER application code.

6.3.1 The platform (OS) server

The web components of FEWER use the CentOS Operating System to host and execute all the necessary application code. CentOS is a Free and Open-Source Operating System based on the Linux platform. This manual does not cover the process of installing the OS but will provide the following specification for the OS selection and configuration:

Table 6.3 Platform Considerations for FEWER Installation

Configuration	Specifications
Swap	Swap is required and should be at least 1.5 times the amount of available primary memory (RAM)
RAID	The use of RAID 5 is recommended to provide an acceptable balance between data redundancy and performance.
SELinux	The use of Security-Enhanced Linux (SELinux) is highly recommended to improve protection of web resources against unauthorised manipulation and access.
IDS	Intrusion detection systems provides a means of monitoring access to system resources. A common and well-supported IDS within CentOS is the AIDE program. An excellent web source covering the installation and usage of AIDE can be found at techrepublic.com.
Firewall Id	Firewalls are required for any public-facing application server. An excellent web resource covering the firewall concepts and the installation within CentOS is provided by digitalocean.com.
User account	While the manual uses the root account, it is highly advisable to create a secondary account to manage the OS. You are reminded that using the “root” user is dangerous in the Linux environments.

After successfully installing the OS platform, the following sequence of steps is required to install and run the web services. Note that while there may be more graphical user interface-based approaches, we utilise the command line for most of the instructions within the manual. To log into the remote server, we utilise the SSH software. SSH provides secure shell access that allows the user to send instructions to the remote server while minimising compromise from malicious users.

After configuring the installation of the CentOS (v7) server, we log into the machine using the root user and the given password. This is illustrated in Figure 6.1.

```
mikkel@mikkel-VirtualBox:~$ ssh root@159.65.37.87
root@159.65.37.87's password:
You are required to change your password immediately (root enforced)
Changing password for root.
(current) UNIX password:
New password:
Retype new password:
[root@centos-s-1vcpu-1gb-nyc3-01 ~]#
```

Figure 6.1 Successful authentication into remote FEWER server

If this is the first time accessing the machine, the system will require the configuration of a new set of credentials for the user as illustrated.

6.3.2 The HTTP Server Installation

The HTTP server handles the communication between the web services and the clients such as end-users in the web and mobile applications. While the main programming language used to develop the program code is Python, the system utilises an LMAP-based architecture. A detailed explanation of the architecture and process can be found on digitalocean.com. The following sections will highlight the important steps needed to get FEWER installed. Refer to the supplemental resources for a deeper understanding of the process and justification of tools.

Enter the following command to install the Apache HTTP server:

sudo yum install httpd -y

This will install the Apache HTTP server using the yum, the command line software used by CentOS to manage software packages. During the installation, we will be asked for permissions to install the application and its dependencies as illustrated in Figure 6.2. Accept the request by typing “y” and pressing the enter key when prompted.

```
Dependencies Resolved

================================================================================
 Package            Arch        Version                     Repository    Size
================================================================================
Installing:
 httpd              x86_64      2.4.6-67.el7.centos.6       updates      2.7 M
Installing for dependencies:
 apr                x86_64      1.4.8-3.el7_4.1             updates      103 k
 apr-util           x86_64      1.5.2-6.el7                 base          92 k
 centos-logos       noarch      70.0.6-3.el7.centos         base          21 M
 httpd-tools        x86_64      2.4.6-67.el7.centos.6       updates       88 k
 mailcap            noarch      2.1.41-2.el7                base          31 k

Transaction Summary
================================================================================
Install  1 Package (+5 Dependent packages)

Total download size: 24 M
Installed size: 32 M
Is this ok [y/d/N]: y
```

Figure 6.2 Apache Installation Confirmation Prompt

Once this is completed, start the Apache by running the command:

sudo systemctl start httpd

The successful installation of the Apache HTTP Server can be confirmed by navigating to the URL http://your_server_IP_address/ in your preferred web browser. If successful, the confirmation page highlighted in Figure 6.3 will be displayed.

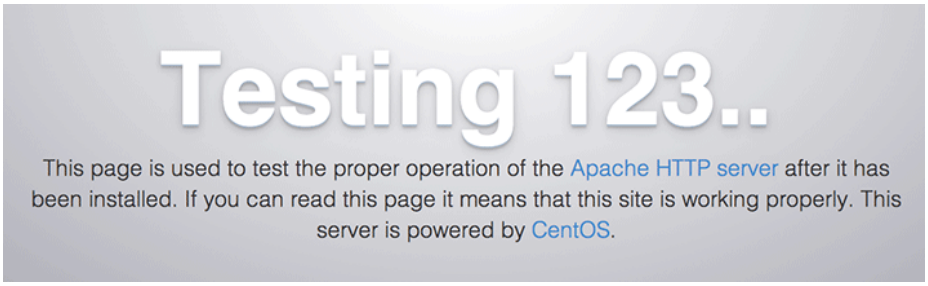


Figure 6.3 Default Apache Landing Page

6.3.3 MySQL installation

After the installing the Apache HTTP Server, we will install the MySQL Database Management System (DBMS). The following steps highlight the process for installing MySQL on CentOS 7 and is a modification of the original article found on dbahire.com. Refer to the original article for a more detailed explanation of steps used in this manual.

We will install the appropriate repository for MySQL of CentOS 7.5 using the command:

sudo yum install http://dev.mysql.com/get/mysql-community-release-el7-5.noarch.rpm

When the command is run, the system will request permission to download the file after permission is granted it will download and install the MySQL when complete the screen shown in Figure 6.4 MySQL Installation Figure 6.4 will be displayed.

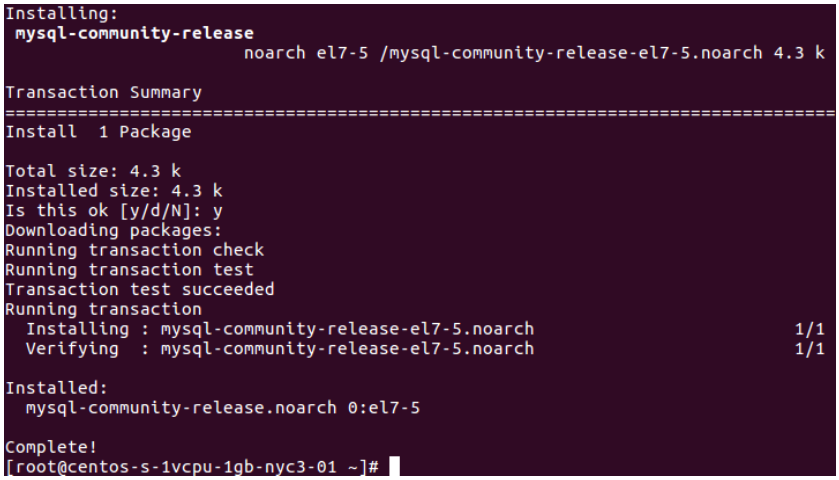


Figure 6.4 MySQL Installation

It is advised after to run the command:

sudo yum install yum-utils

The command will help maintain the yum client. After this is done we continue with the installation and configuration of the MySQL. The next thing we do is run the command:

sudo yum install mysql-community-server

When run, a download permission request will be made before downloading the required packages. Once the download and installation are done the MySQL will have been installed and can be started using the command:

sudo systemctl start mysqld

After completing the installation of the database, we will configure the security settings of the database using the command:

6.3.4 phpMyAdmin installation

Next, we will install phpMyAdmin to manage the database easier. To do this an in-depth guide can be found here: Digital Ocean PHPMyAdmin Installation guide. First, we need to retrieve the packages to install. To do this, we will use the EPEL repo (Extra Packages for Enterprise Linux) which contains many additional packages, including the phpMyAdmin package we require. We get this repo by running the following command on the server:

sudo yum install epel-release

After the packages are retrieved we can install phpMyAdmin to the server by running the command:

sudo yum install php php-mysql php-fpm phpMyAdmin

During installation, permission will be requested to download packages to complete the installation. When the installation is complete, the configuration needs to be done which is done in a configuration file that was included in the installation. We can open this file by running the command:

sudo nano /etc/httpd/conf.d/phpMyAdmin.conf

If an error that reads "-bash: nano: command not found" is returned, it means that the text editor "nano" is not installed in the server operating system and needs to be installed. We can install nano by running the command:

sudo yum install nano

When the configuration file is opened it will appear as shown in Figure 6.5:

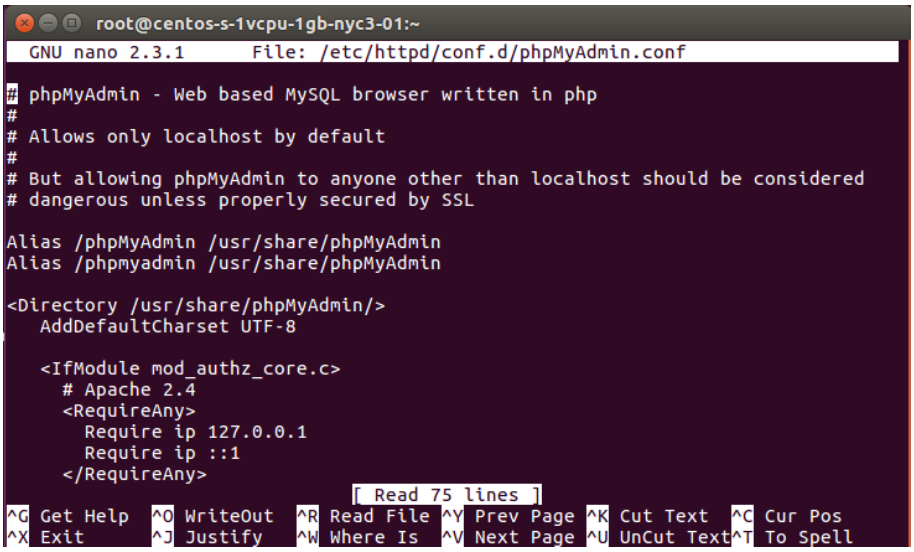


Figure 6.5 Configuration File Opened

In this file change any lines that read “Require IP 127.0.0.1” or “Allow from 127.0.0.1” to refer to your computer’s IP address for example “Require IP 127.0.0.1” should now be “Require IP 167.8.3.7”. If we want to allow all IP addresses to connect to the server our file should look like “Require IP 0.0.0.0” as illustrated in Figure 6.6. Allow from All is also required to enable applications to access the phpMyAdmin interface from an external machine.

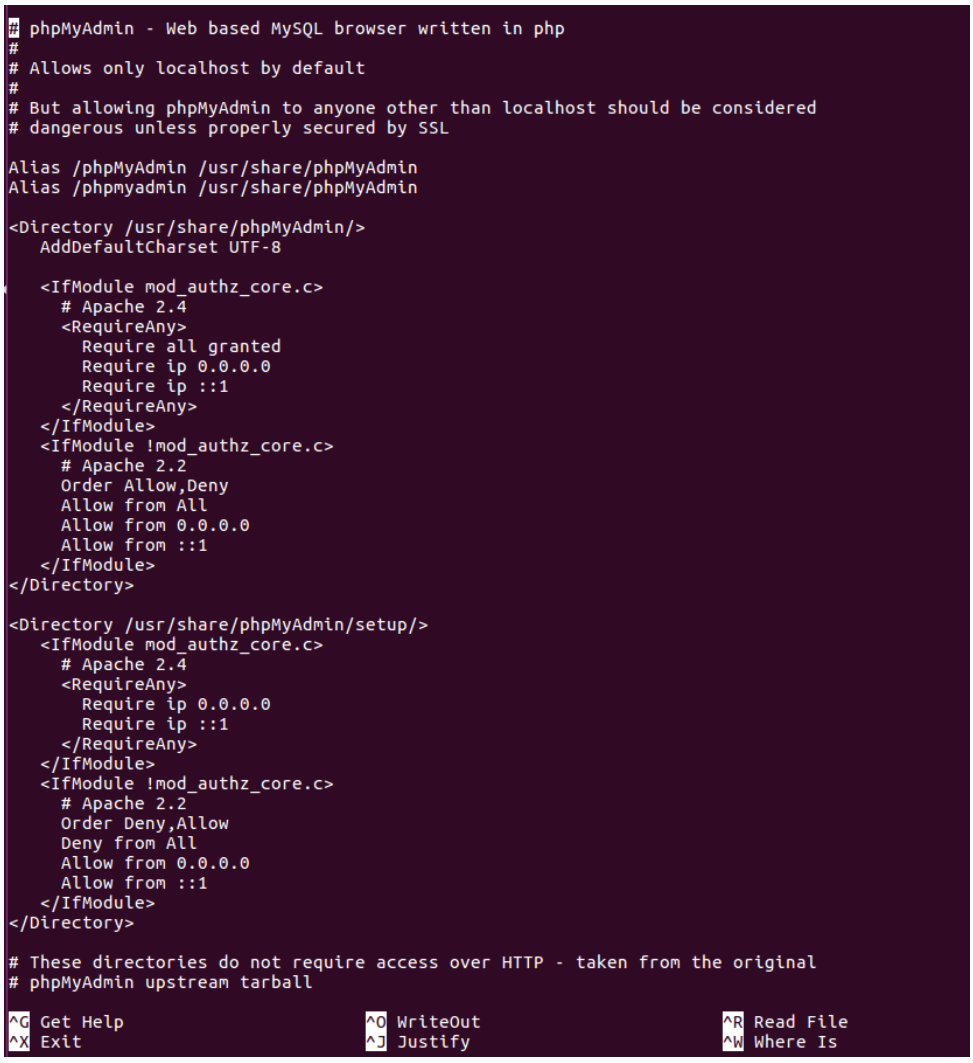


Figure 6.6 IP Address Changes

When this is completed press the keys Ctrl + o to write to the file and the enter key to save the name. We can run the command:

sudo nano /etc/httpd/conf.d/phpMyAdmin.conf”

This command will open the file again to confirm the changes. When we are finished we can restart the Apache HTTP server using the command:

sudo systemctl restart httpd.service

6.3.5 Installation of the FEWER application code on the server

Now we will move onto the installation of the web system to the server. Before we can clone the FEWER repository, we need to set up with some dependencies. First, we are going to install some general development tools and some development tools to use with MySQL using the yum client with the commands:

sudo yum groupinstall 'Development Tools'
sudo yum install mysql-devel mysql-libs python-devel MySQL-python mod_wsgi – y

Next, we will install "pip" which is a package manager for python software packages and we do this with the command:

sudo yum install python-pip -y

Following this, we will install python virtualenv which is a tool to create virtual python environments. To install it will need to run the command:

sudo pip install virtualenv

Now we are ready to clone the repository (download the application code) and configure it. We will place the code within the apache configured web folder. The folder will have appropriate permissions configured, so it will reduce some of the tasks that we will be required to do. Navigate to the Apache web folder with the following command:

cd /var/www/

To clone it we will run the command:

git clone https://ewer_fish@bitbucket.org/ewer_fish/fewer_webservices.git fewer

```
[fewer@fewer-test ~]$ cd /var/www/
[fewer@fewer-test www]$
[fewer@fewer-test www]$ git clone https://ewer_fish@bitbucket.org/ewer_fish/fewer_webservices.git fewer
fatal: could not create work tree dir 'fewer'.: Permission denied
[fewer@fewer-test www]$ sudo git clone https://ewer_fish@bitbucket.org/ewer_fish/fewer_webservices.git fewer
[sudo] password for fewer:
Cloning into 'fewer'...
remote: Counting objects: 20633, done.
remote: Compressing objects: 100% (8847/8847), done.
remote: Total 20633 (delta 12609), reused 18831 (delta 11047)
Receiving objects: 100% (20633/20633), 117.86 MiB | 30.46 MiB/s, done.
Resolving deltas: 100% (12609/12609), done.
[fewer@fewer-test www]$ sudo chmod 0765 -R fewer/
[fewer@fewer-test www]$ cd fewer/
[fewer@fewer-test fewer]$ ls
alembic.ini  development.ini  gulpfile.js  mfisheries    package-lock.json  production.ini  requirements.txt  setup.py
circle.yml   docs             MANIFEST.in  package.json  Procfile           README.md       runtime.txt       workbox-config.js
[fewer@fewer-test fewer]$
```

Figure 6.7 - Successful Cloning of FEWER Repository

Now that we have successfully cloned the repository as illustrated in Figure 6.7, we must now configure it. First, we will activate the virtual environment of the web system to begin configuration. We will navigate to the folder containing the web system, then create a virtual environment and then activate the environment. These steps can be completed by running the following commands in order:

sudo usermod -aG apache fewer
sudo chown apache:apache -R fewer/
cd fewer/
virtualenv venv
source venv/bin/activate

Now that the virtual environment is set up and activated we will install necessary pip dependencies required by the web system with the following command to install the system python packages

pip install -e .

After this we will update the development.ini file which contains information for the default database and connections and then install the database. First update the development.ini files with the database credentials to be used for FEWER. After configuring the development.ini file, install the database tables used in the application. To be able to do this we are going to run the command:

git update-index --assume-unchanged development.ini
initialize_mfisheries_db development.ini

Following this we will install the bower components used on the front end of the web system. If bower is missing, we can install it by first installing NodeJS to the server and using the node package manager (NPM) to install bower. The commands to install NodeJS, NPM and Bower are as follows:

sudo yum install nodejs
npm install
sudo npm install -g node-gyp bower
bower install (add the "--allow-root" option if the error "bower ESUDO Cannot be run with sudo" is shown)

Next, we will ensure the read and write access permissions used by http:

```
cd ../
sudo chown apache:apache -R fewer/
find . -type f -exec chmod 0644 {} \; # File permissions, recursive
find . -type d -exec chmod 0755 {} \; # Folder permissions, recursive
cd mfisheries_webservices
# Allow write only to specific dirs
sudo chcon -t httpd_sys_rw_content_t fewer/logs -R
sudo chcon -t httpd_sys_rw_content_t fewer /static/country_modules -R
sudo chcon -t httpd_sys_rw_content_t fewer /static/userimages -R
sudo chcon -t httpd_sys_rw_content_t fewer /modules/weather/parsers/extractors -R
```

Then we will configure the Apache server to communicate with the python application using WSGI. The following are code extracts from the two files needed to complete the installation.

The extract is the "pyramid.conf" file located in the apache configuration folder "/etc/http/conf.d"

```
#WSGIApplicationGroup mfisheries
WSGIProcessGroup mfisheries
#WSGIPassAuthorization On
WSGIDaemonProcess mfisheries python-
path=/var/www/mfisheries:/var/www/mfisheries/venv/lib/python2.7/site-packages

WSGIScriptAlias /mfisheries /var/www/mfisheries/pyramid.wsgi

Alias /mfisheries/static /var/www/mfisheries/mfisheries/static

<Directory /var/www/mfisheries/mfisheries/static>
    WSGIProcessGroup mfisheries
    Order allow,deny
    Require all granted
    Allow from All
</Directory>

<Directory /var/www/mfisheries/>
    WSGIProcessGroup mfisheries
    Order allow,deny
    Require all granted
    Allow from All
</Directory>

<Directory /var/www/mfisheries/>
    <Files "pyramid.wsgi">
        Require all granted
    </Files>
</Directory>
```

The extract is from the pyramid.wsgi file located within fewer folder.

```
import os, site, sys
os.environ['PYTHON_EGG_CACHE']='/home/fewer/.cache/main/mf/Python-Eggs'

# Add the site-packages of the chosen virtualenv to work with
site.addsitedir('/var/www/fewer/venv/lib/python2.7/site-packages')

# Add the app's directory to the PYTHONPATH
sys.path.append('/var/www/fewer')

# Activate your virtual env
activate_env=os.path.expanduser("/var/www/fewer/venv/bin/activate_this.py")
execfile(activate_env, dict(__file__=activate_env))

from pyramid.paster import get_app, setup_logging

# ini_path = './development.ini'
ini_path = '/var/www/fewer/development.ini'

setup_logging(ini_path)

application = get_app(ini_path, 'main')
```

After modifying the configuration files, restart the HTTP server and navigate to the web server's URL. Once everything was configured correctly the log-in page of the web application should be displayed as illustrated in Figure 6.8.

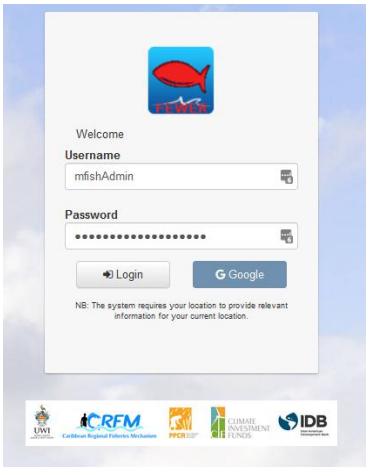


Figure 6.8 Log-in page of FEWER

6.4 Configuration of the Web Application

Configuring the front-end web application requires some libraries to be configure and installed. To do this, the following commands are to be executed:

cd mfisheries/static
bower install bower.json

This will install all the required libraries specified in the bower.json file that the front-end needs.

6.5 Configuration of the Mobile Application

The configuration of the mobile application requires the cloning of the git repository. Cloning can be accomplished using the following command:

git clone https://ewer_fish@bitbucket.org/ewer_fish/fewer_mobile.git

When this it completed the project is ready to be worked on. The recommended editor to be used is Android Studio, particularly version 3.1.2. If a legacy version of less than 3.0 is used the project will not be able to be built.

6.5.1 Requirements

To install the mobile application of FEWER and related functionality, the following are required at a minimum:

1. Windows 10 (build 1511 or later) or MacOS (10.13.2 or later) or Ubuntu Linux (17.10 or later)
2. 6GB or greater of RAM
3. 64GB or greater of free secondary storage
4. Android SDK 26.1.1 or later
5. Android SDK build tools 27.0.2 or later
6. Java Development Toolkit (JDK) v8 or later
7. Android Studio 3.2.1 or later

6.5.2 Configuration in Android Studio

To install the mobile app, you can retrieve the source code using the Android Studio IDE.

Upon launch, the IDE presents a set of options for managing projects, as shown in Figure 6.9.

To retrieve the source code, use the “Check out project from Version Control” option in the menu.

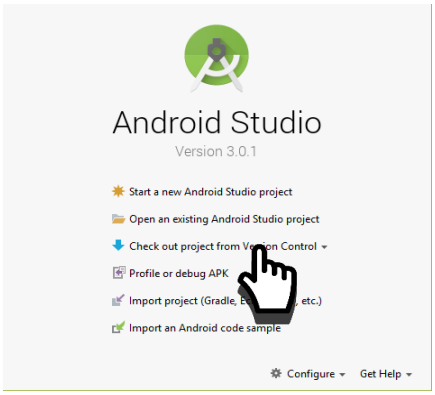


Figure 6.9 Android Studio IDE Start Menu Options

The menu opens a window that enables the specification of the source of the code to be retrieved; and the specific path where the code will be stored on the local machine, as shown in Figure 6.10.

The repository URL is https://bitbucket.org/ewer_fish/fewer_mobile.

Figure 6.10 Check Out Configuration Window for Android Studio

After downloading the source code through the “check out” process, Android Studio will install the required packages and configure IDE for the project.

After completing the installation, the project is available in the side menu, shown in Figure 6.11.

Resources are grouped based on purpose within the Android development environment.

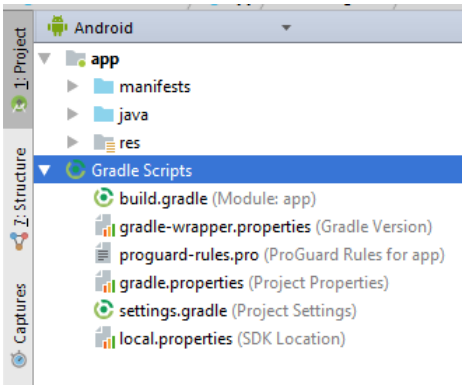


Figure 6.11 Installed Android Project

Once installed any changes made to the application can be tested by installing the modified mobile app on an android phone via USB connection.

To do this we click on the green play button in the top menu bar which will bring up a dialog to select which USB connected android phone to use as shown in Figure 6.12.

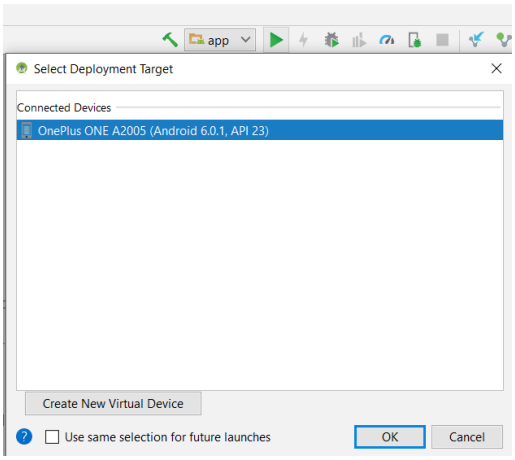


Figure 6.12 Installing Mobile App on Selected Phone

Once installed on the device the application can be monitored by viewing the devices logs while still connected by USB.

To view these logs by clicking on the "Logcat" option on the bottom menu bar which will bring up the window displaying the device logs as shown in Figure 6.13.

Figure 6.13 Viewing Application Logs from Mobile Phone

6.6 Configuration of Third Party Services

The primary 3rd party service used in FEWER is the Firebase Cloud Service. Configuration for Firebase in required for both the Web and Mobile Systems.

6.6.1 Firebase Mobile Configuration

To configure the mobile application connection to the firebase service, first we must go to the firebase console via the URL: https://console.firebase.google.com/. Then access the project overview for the FEWER project. Once we are there we open the settings view of the project overview and under the General tab we will find the App ID as well as a link to download the google services file as shown in Figure 6.14.

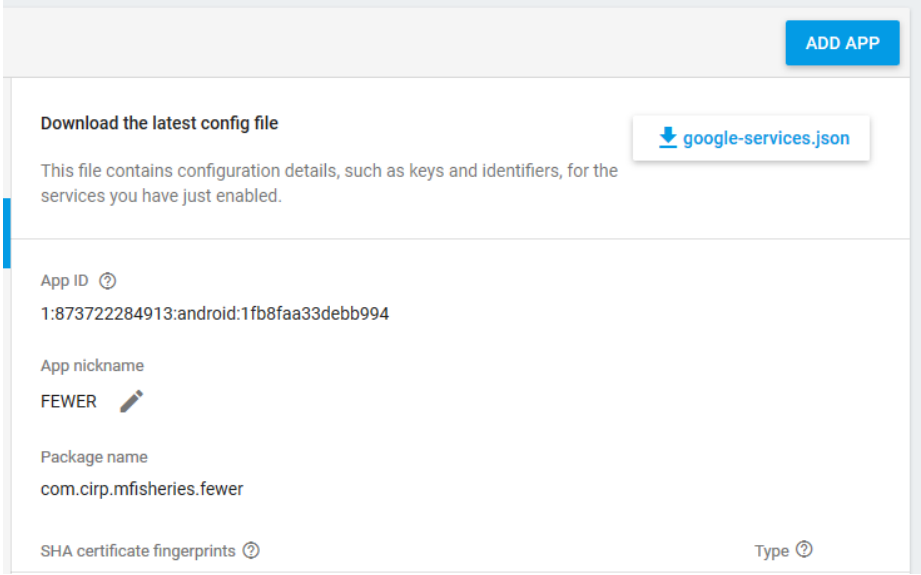


Figure 6.14 Firebase App google services download

Once we have the Google Services file, we must place it into the android application. It must be places in the root of the "src" folder of the application as shown in Figure 6.15.

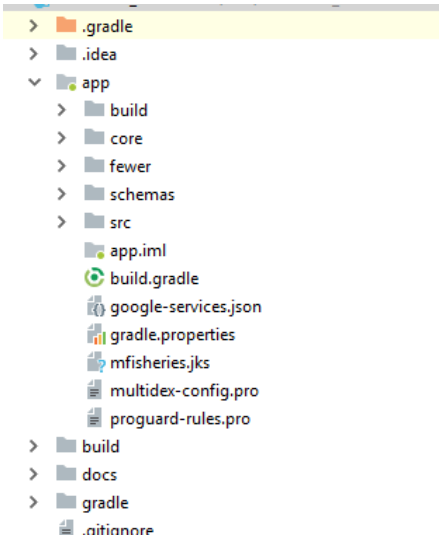


Figure 6.15 Google Services Placement

6.6.2 Firebase Web Configuration

To configure the Firebase service for the Web application, we will need both the API Key which can be found in the Project settings as well and the Connection string which can be found in the database overview. The API key is found in the general project settings as shown in Figure 6.16.

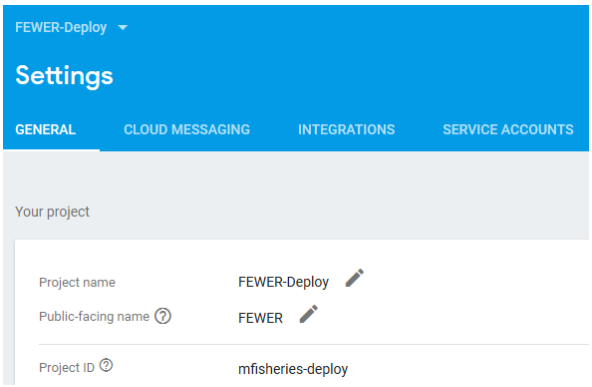


Figure 6.16 API Key Location

The settings page would show various details needed for the configuration of the Firebase system. A partial portion of the setting page is illustrated in Figure 6.17.

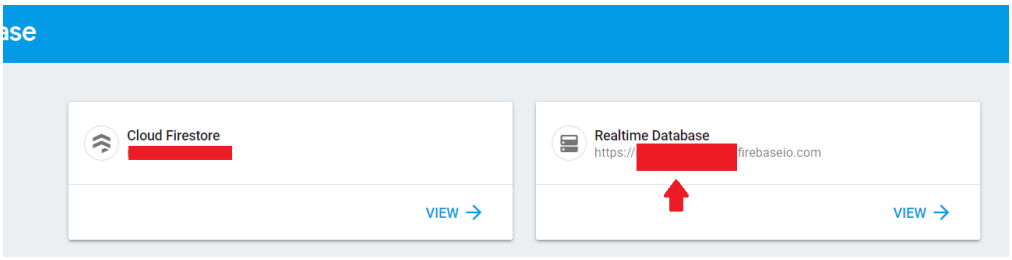


Figure 6.17 Connection String location

Once these two values are acquired we place them in the System Data Configuration table as shown in Figure 6.18.

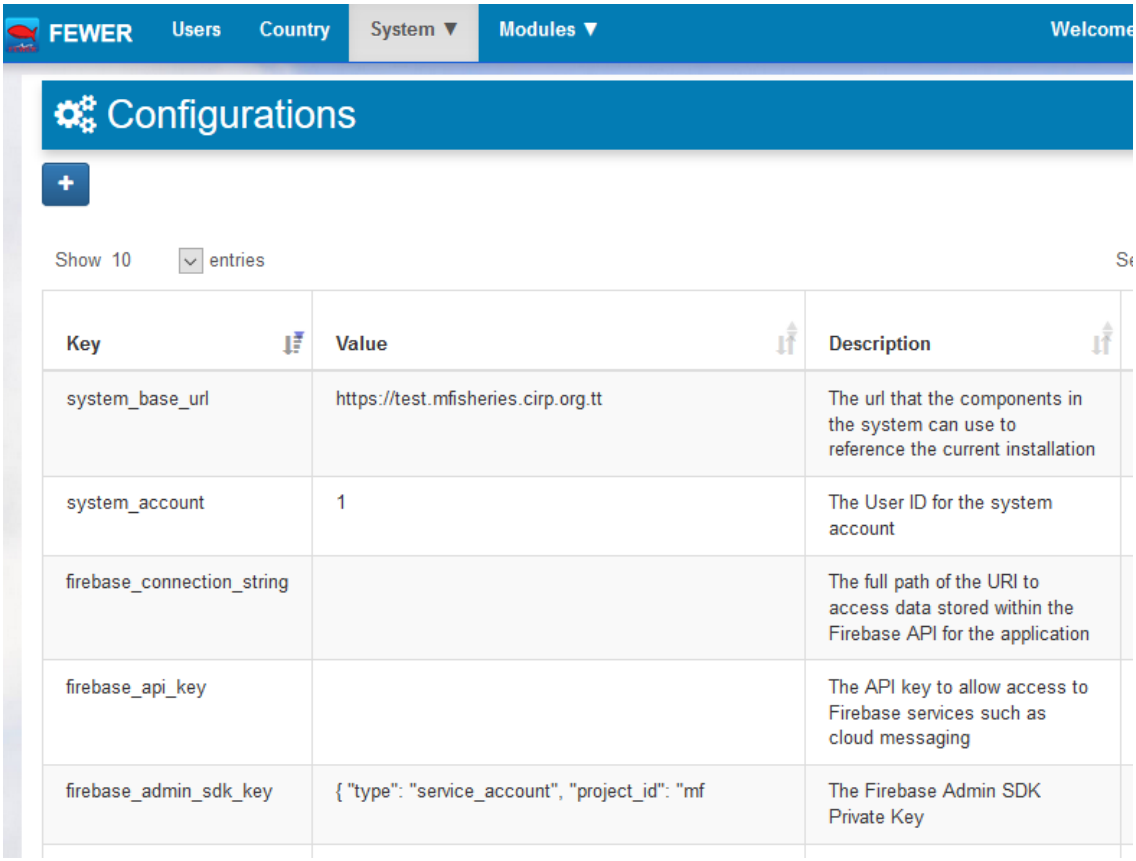


Figure 6.18 Data Configuration Dashboard

6.7 Configuration of Backups and Redundant Services

Percona XtraBackup is an open source software solution for automating backups of databases within the MySQL DBMS. The FEWER system utilises a Hot backup strategy. Further explanation of the terms and configuration can be found on digitalocean.com. The manual will highlight the main steps involved in the configuration of the XtraBackup for fewer.

Download the XtraBackup installation repository using the command:

sudo yum install https://www.percona.com/redir/downloads/percona-release/redhat/latest/percona-release-0.1-4.noarch.rpm

After the repository is configured, install the software using the command:

sudo yum install percona-xtrabackup

The configuration of the backups is accomplished using the innobackupex command-line software. For example, a backup can be created with the command:

innobackupex --user=bkpuser --password=bkppassword --no-timestamp /data/backups/new_backup

The system will perform a backup of the database, without causing a disruption to the database availability. To automate the process, we utilise cron-jobs of the Linus OS. The frequency of the cron-job should be based on the backup strategy of the organisation.

6.8 Application Configuration

Once FEWER is installed, the global administrator must configure some universal parameters that apply to all country instances. These include data and specific email addresses. These are configured from the System option in the main menu shown in Figure 5.1.

6.8.1 Data Configuration

Data configuration is required to set certain variables required for the mobile and web application. These "keys" and their descriptions are summarized in Table 6.4.

Table 6.4 Data Configuration Keys

Key	Description
Alert Source Interval	The Intervals in minutes to poll the various alert sources for new alerts
App Version Min	The minimum app version code required for the mobile app to run
App Version Recommend	The recommended app version code for mobile app to run
Firebase Admin SDK Key	The Firebase Admin SDK Private Key
Firebase API Key	The API key to allow access to Firebase services such as cloud messaging
Firebase Connection String	The full path of the URI to access data stored within the Firebase API for the application
System Account	The User ID for the system account
System Base URL	The URL that the components in the system can use to reference the current installation

6.8.2 Emails Configuration

The email configuration specifies the email addresses to which error reports from weather extractor functionality are sent. If an extractor fails to execute correctly, the error details are sent to these email addresses for debugging purposes.

7. Providing Data to FEWER External Consumers through GeoNode

7.1 What is GeoNode?

GeoNode is a web-based application and platform that aggregates and manages geospatial information.[4] FEWER enables external GeoNode installations to access, archive and aggregate public data generated by fishers. Access to the public data is facilitated through API calls to FEWER Web Services. Data is available from the LEK and the Damage Reporting modules generated by fishers and stored within the FEWER database. The data is provided as shapefiles which can be incorporated into the GeoNode through its REST API. An overview of the interacting components is illustrated in Figure 7.1.

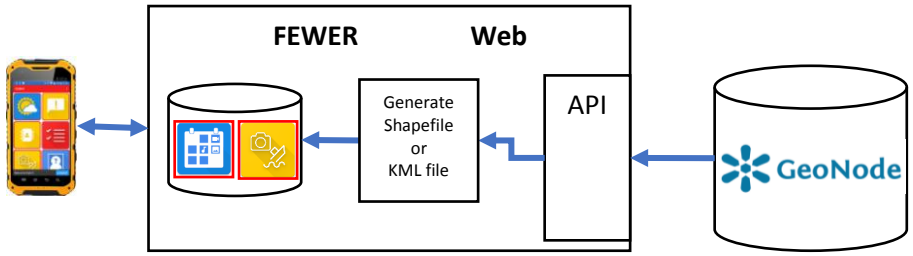


Figure 7.1 GeoNode and FEWER Interaction

7.2 How to access data for GeoNode?

The URLs for accessing the shapefiles needed for importing data into GeoNode are provided in Table 7.1.

Table 7.1 URL for Access GeoNode Compatible Shapefiles

Module	URL
Damage reporting	/api/damagereport/data/export
LEK	/api/lek/data/export

The API provides optional parameters for controlling the data received. The parameters are defined as URL queries to the URLs specified in Table 7.1. The available parameters and their descriptions are provided in Table 7.2.

Table 7.2 URL Query Parameters for Shapefile Requests

Parameter	Expected Value	Description
start	dd-mm-yyyy	The start parameter specifies the date of the earliest data record required.
end	dd-mm-yyyy	The end parameter specifies the date of the most recent data record required.
Type	kml or shape	Determines the type of information that is produced by the API request

[4] Introduction to GeoNode. Available at http://docs.geonode.org/en/latest/index.html

8. Testing

The following sections highlight the important steps needed to test FEWER installation.

8.1 API and Endpoints Testing

8.1.1 Overview

To ensure the stability of the FEWER system, aspects of it must be tested to detect any possible issues. These aspects are the FEWER Web Services, which perform data management, the Extractors, which handle weather information retrieval, and the Mobile Android Application.

8.1.1.1 FEWER Web Services

The FEWER Web Services is a web service Application Programming Interface (API) developed using HTTP requests to perform data actions such as retrieval, update and deletion of data records in the web system. It is important to test these API calls to ensure that FEWER can provide services for the web and mobile applications.

8.1.1.2 Extractors

8.1.1.2.1 What is an Extractor?

Within the system extractors are files that are run within the FEWER system to retrieve hydro-met data from a specific weather source. These files can be set to run on a schedule or manually at any time by an administrator.

8.1.1.2.2 How do I access source code for extractors?

To access the source code for the extractors the following link to a git repository containing the source can be used to clone the repository. Once the repository has been cloned the instructions found in the ReadeMe.md file is to be followed to install the remaining dependencies to run the extractors from the command line interface.

8.1.1.2.3 How do I represent an extractor?

Representation of an extractor requires knowledge of the python programming language and object-oriented concepts. They are composed of multiple variables and functions that are necessary in carrying out its task to retrieve weather information. More information can be found in the Weather Extractor Documentation Manual.

8.1.2 Procedure

Instructions for testing the various components of the FEWER web system are provided in a resource guide called Testing.md. This resource can be found in the “Docs” folder of the application code. This guide documents the commands used to test the components of the system as well as instructions to install the necessary dependencies needed to conduct the tests. All the available tests are located in the “test” folder. The tests are executed by running the setup.py file. The following sections will highlight specific tests that can be conducted on FEWER.

8.1.2.1 How do I test the FEWER REST API?

To test the REST API calls, the following command is run on the via the command line:

py.test -q -s mfisheries/tests/test_api.py::APITests

This command will conduct tests on all the FEWER API endpoints. It ensures that the APIs are functional and produces the appropriate results based on the data provided. Figure 8.1 provides an example of a successful test result.

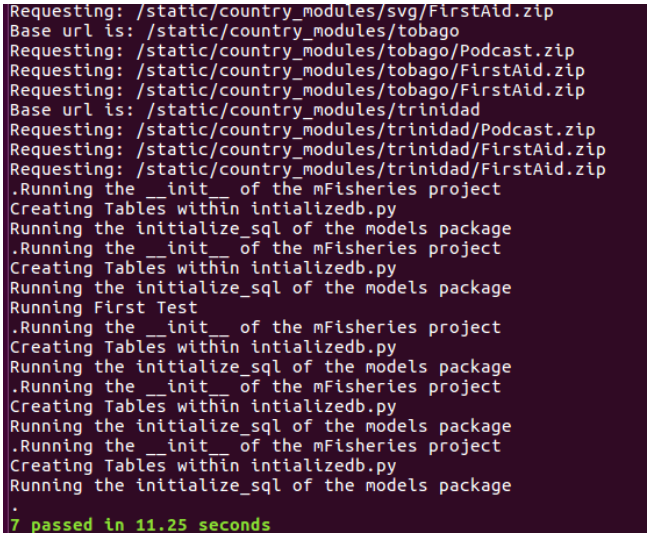


Figure 8.1 API Testing

8.1.2.2 How do I run tests on an extractor?

An extractor can be tested by running the extractor file from the command line to determine if the correct information is being retrieved by the extractor. To do this the command while within the correct folder containing the file is "python filename.py". All the extractors can also be tested by running the "test_extractors.py" file from the tests folder in the repository. The command to do this is:

py.test -q -s mfisheries/tests/test_extractors.py::ExtractorTest

When the test is complete a successful result is displayed as highlighted in Figure 8.2.

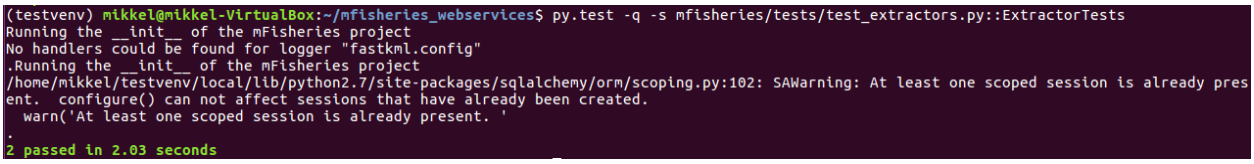


Figure 8.2 Extractor Testing

8.1.2.3 How do I test the Android communication with the endpoints?

The tests for the android communication endpoints with the system are stored in the project under a directory labelled "androidTest". Inside this there is a sub directory labelled "java". Within the java directory there are sub directories that will have the names of the FEWER modules. As seen in the Figure 8.3 below.

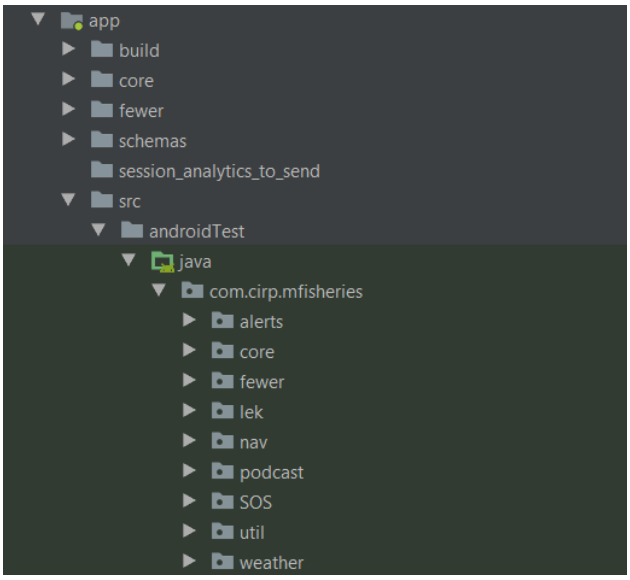


Figure 8.3 Android Directory Hierarchy

Within these sub directories there are java files that run tests on the various modules and endpoints for those modules to function. To run one in Android Studio after opening the file, the green play button that will appear next to functions can be used to run the test associated to the function. To run all the tests in a file the entire file can be executed instead using the double green play button at the top of the files main class in the editor. This can be seen in Figure 8.4.

```
@RunWith(RobolectricTestRunner.class)
public class MainTest {

    private MainActivity activity;
    private String[] moduleNames;
    private ModuleFactory moduleFactory;

    @Before
    public void setup() {
        ShadowLog.stream = System.out;

        moduleNames = ModuleUtil.MODULE_ORDER;
        List<String> selectedModules = Arrays.asl
        FileUtil.saveModules(selectedModules);
        activity = Robolectric.setupActivity(Mair
        moduleFactory = ModuleFactory.getInstanc
    }

    //Ensures that all available modules extend t
    @Test
    public void doModulesExtendClass() {
        for (String name : moduleNames) {
            System.out.println(name + "");
            Module module = moduleFactory.getModu
            assertNotNull(module);
            assertThat(module, instanceOf(Module.
        }
    }
```

Figure 8.4 Example of Testing Code

The URL for Mobile Repository is: https://ewer_fish@bitbucket.org/ewer_fish/fewer_mobile.git

Results (Table showing results and a description of what is expected)
When any test conducted on the web platform is conducted the results will be displayed in the command line interface screen with three columns as shown in Figure 8.5. The descriptions of these columns are given in Table 8.1.

Table 8.1 Description of Test Result Columns

Name	Stmts(Statements)	Miss	Cover
The name of the file being tested.	Total number of statements in the files code being assessed by the test	Total number of statements of code that are not being assessed by the test	Percentage of the total number of statements being covered by the test

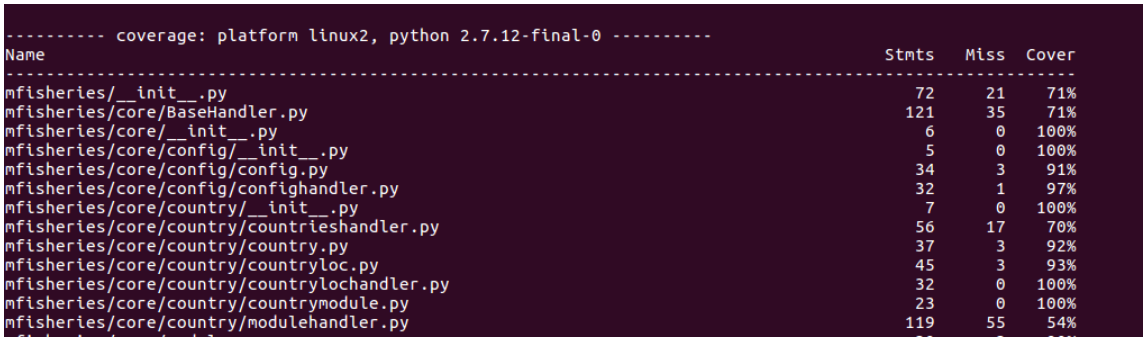


Figure 8.5 Status of tests on different files

When the test is complete a result is given that shows the number of tests that passed, failed and warnings detected as seen below in Figure 8.6.

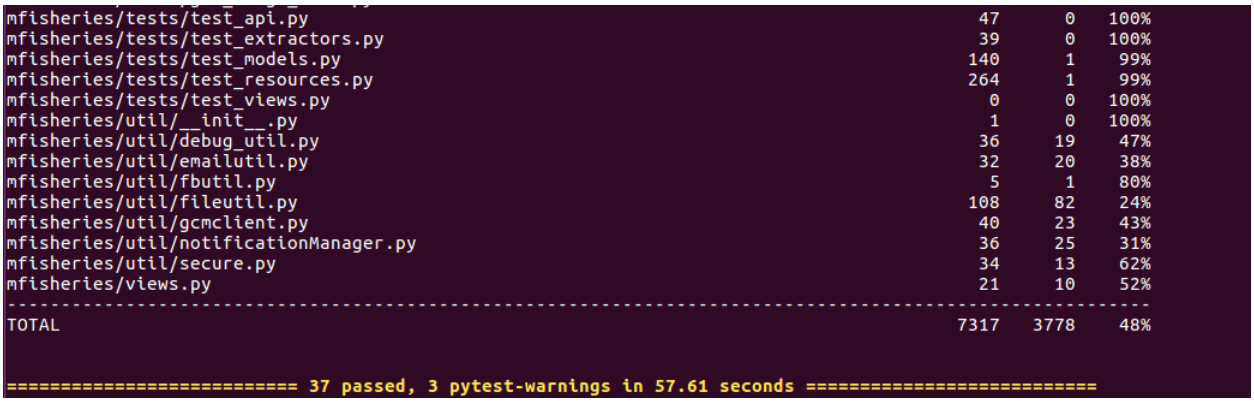


Figure 8.6 Results of test conducted

The Android communication with the endpoints testing was conducted, the results of which are displayed in Table 8.2.

Table 8.2 Android Endpoint Testing Results

Section	Test	Total sub tests	Outcome /Comments	Status	Dates
Core	API Test	4	**4 Passed**	Test Passed	08-05-18

Section	Test	Total sub tests	Outcome /Comments	Status	Dates
			0 Failed		
Core	Modules Test	1	**1 Passed** **0 Failed**	Test Passed	08-05-18
Core	Download Instrumentation Test	1	**1 Passed** **0 Failed**	Test Passed	08-05-18
Alerts	Utilities Test	1	**1 Passed** **0 Failed**	Test Passed	08-05-18
Damage Reporting	Damage Reporting Instrumentation Test	1	**1 Passed** **0 Failed**	Test Passed	09-05-18
Emergency Contacts	Emergency Contacts Instrumentation Test	1	**1 Passed** **0 Failed**	Test Passed	09-05-18
Missing Persons	Missing Persons Instrumentation Test	1	**1 Passed** **0 Failed**	Test Passed	09-05-18
LEK	LEK Instrumentation Test	2	**2 Passed** **0 Failed**	Test Passed	09-05-18
LEK	LEK Utilities Test	1	**1 Passed** **0 Passed**	Test Passed	09-05-18
Weather	Weather Utilities Test	4	**4 Passed** **0 Failed**	Test Passed	07-05-18

8.2 Load Testing

8.2.1 Overview

- Web: http://locust.io
  - https://bitbucket.org/CIRP/loadtesting
- Mobile:
  - How to handle when loading large number of records (especially with images)
    - This is a manual process for testing (the process will be described, and results tabulated)
  - How to handle large number of offline tracks (tracking at scale)
    - This is a manual process for testing (the process will be described, and results tabulated)

Load testing is a methodology used to determine the capability of the system to handle an expected number of concurrent users accessing the system. To do this for the FEWER web platform we make use of the http://locust.io to simulate many users and swarm the system with virtual users.

On the FEWER mobile application this testing is done to determine the handling of large number of records for the various modules when the device has been offline for some time and receives information from the web system. The testing is also done to determine the capacity of the application to send a multitude of offline tracks from the user's device to the server successfully.

8.2.2 Procedure

To conduct the load testing of the FEWER web system using http://locust.io there is a git repository https://bitbucket.org/CIRP/loadtesting which has the requirements to conduct the test. Once the requirements have been installed, run the command shown in the read me folder and execute it.

On the mobile to test the loading of large numbers of records, the application will retrieve records from the web system after being offline, in large amounts to determine its load capacity for record retrieval. The load testing for the offline tracks will be conducted by have a large amount of GPS tracks saved in the applications cache while it is offline and then have it connected to the internet and attempt to send all those points to the server. The web system will be checked to determine if any of the tracks failed to send or placed a load on the server.

8.2.3 Results

When the test is run the URL navigated to will display a screen as shown in Figure 8.7.

Statistics | Charts | Failures | Exceptions | Download Data

Type	Name	# requests	# fails	Median (ms)	Average (ms)	Min (ms)	Max (ms)	Content Size	# reqs/sec
GET	/	26	44	6900	6806	3962	7525	27134	0.1
GET	/api/alerts	11	5	1900	2795	581	7218	40347	0.4
GET	/api/capsources	3	1	380	2272	297	6140	3075	0.1
GET	/api/config	11	11	950	1893	285	6365	4203	0.6
GET	/api/countries	4	6	290	1212	206	4013	987	0.1
GET	/api/country/modules	22	25	390	1469	310	7279	7011	0.5
GET	/api/countrylocs	26	9	900	1997	126	7410	1598	0.6
GET	/api/damagereport	12	1	510	1928	311	6869	16574	0.4
GET	/api/damagereport/category	9	8	420	1443	199	6318	6846	0.2
GET	/api/emergencycontact	20	16	1400	2434	271	7527	15644	0.5
GET	/api/groups	7	4	1100	3136	410	7310	18890	0.1
GET	/api/lek	14	13	620	1400	395	7207	34960	0.6
GET	/api/missingpersons	38	9	820	1729	514	7613	26662	1.1
GET	/api/modules	16	17	350	1811	129	7023	704	0.3
GET	/api/occupations	13	12	1600	2539	151	6971	13745	0.6
	Total	**232**	**181**	**820**	**2494**	**126**	**7613**	**16390**	**6.2**

Figure 8.7 Load Testing Results

9. System Deployment

9.1 Hardware and Services Requirements

Deployment of the system requires both hardware and software components. A detailed specification of the hardware requirements and services needed for FEWER can be found in Appendix Section 11.2 of this document.

9.2 Web Services and Application Deployment

Once the Apache HTTP server, MySQL database, web services and web application are successfully configured, then the application is deployed. No additional steps are required for the deployment of the web-based services.

Google analytics is used to evaluate how the application is used by end-users. Google analytics provides several tools that can be used to evaluate how many users are accessing the system as illustrated in Figure 9.1.

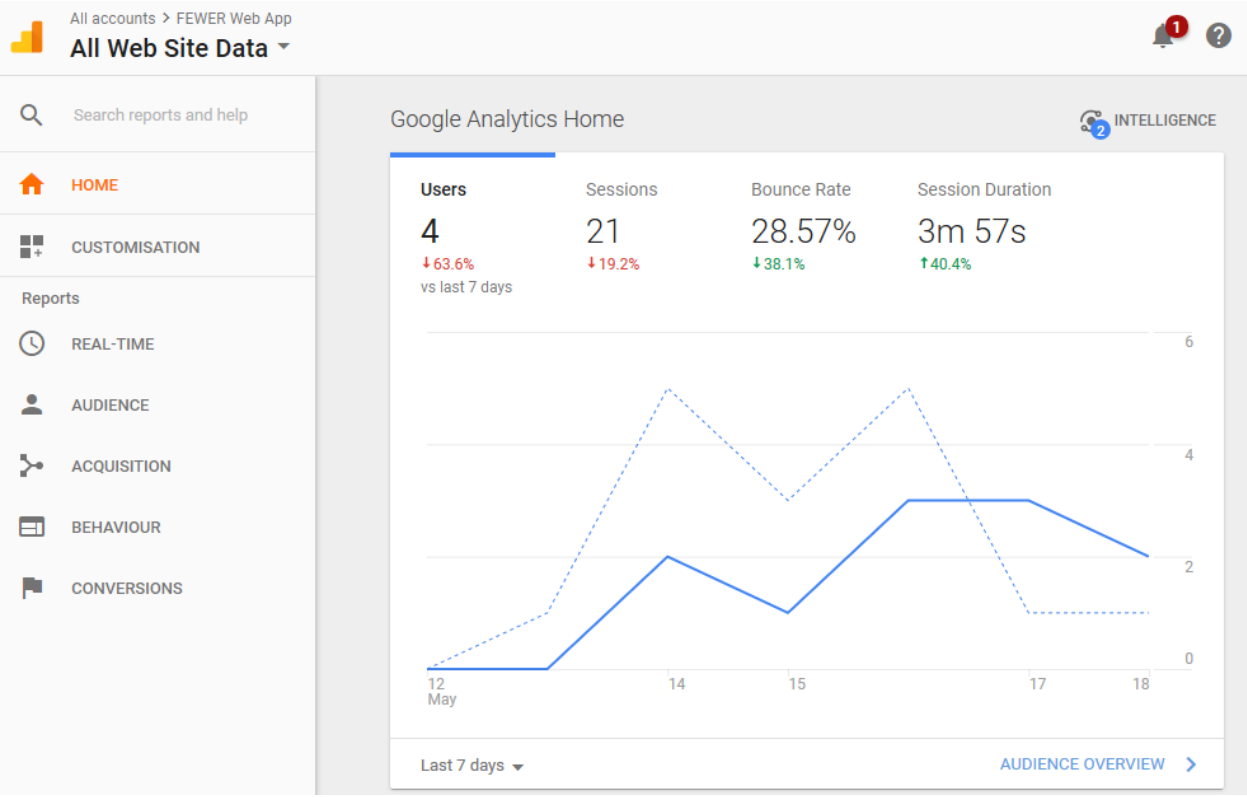


Figure 9.1 - Google Analytics Home Screen

9.3 Mobile Application Deployment

The mobile application is deployed to the Google Play Store under the name “FEWER”. From the Google Play Console dashboard, the application can be monitored, and updates deployed for users’ mobile phones to download. The Google Play Store’s publisher dash board is shown in Figure 9.2.

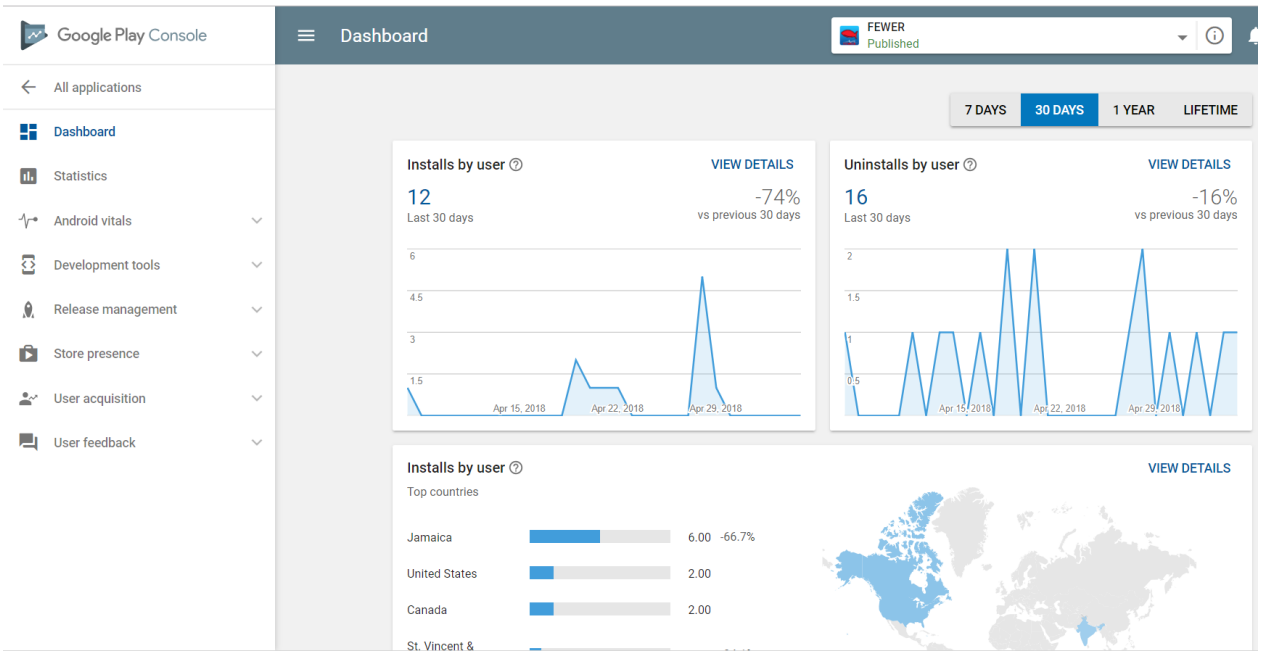


Figure 9.2 Google Play Publisher Dashboard.

To update the mobile application, we will select the Release Management option in the side menu of the publisher dashboard which will bring up the Release Management screen as shown in Figure 9.3.

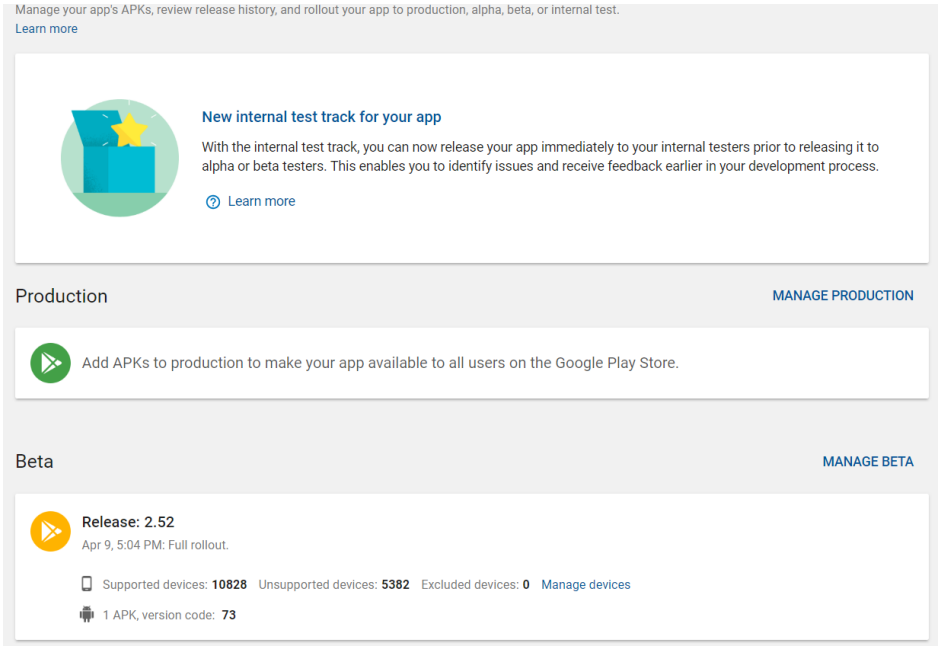


Figure 9.3 Release Management screen

This is where we manage the releases for the application. Clicking on the Manage Production/ Manage Beta button will load the dashboard showing the information of the release type selected (Release or Beta) as illustrated in Figure 9.4.

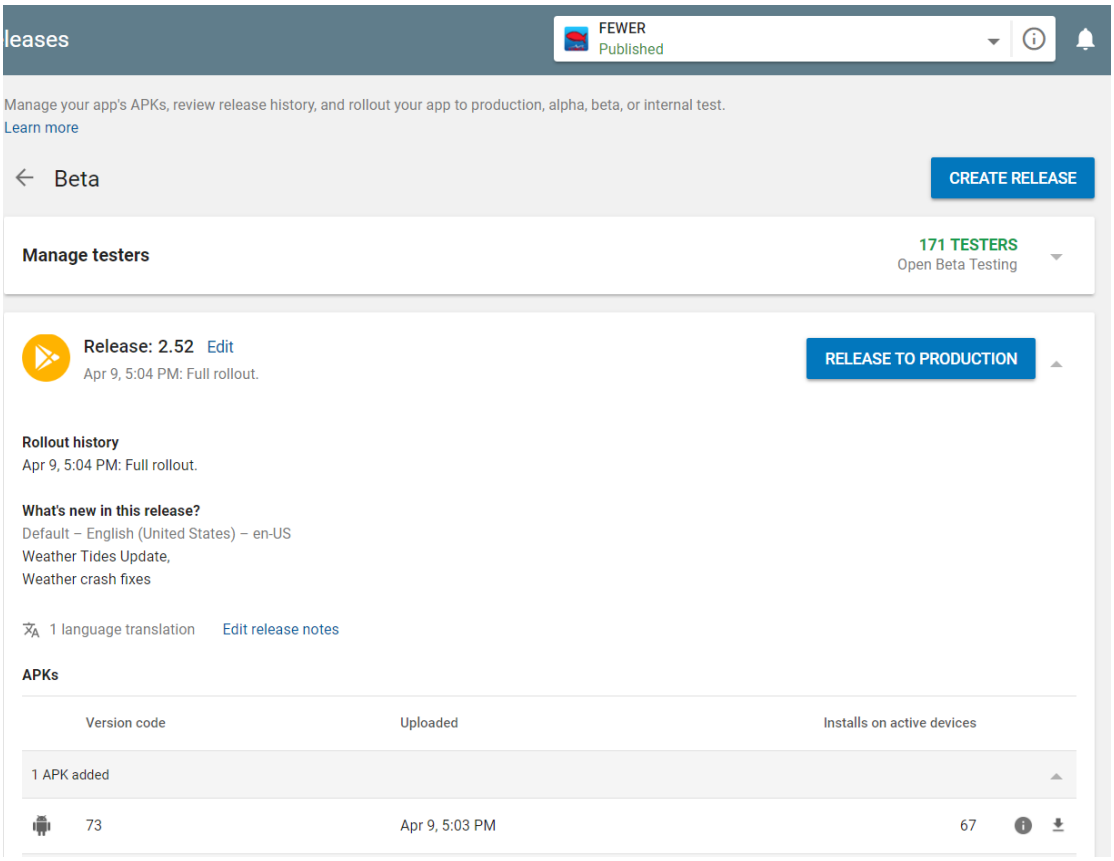


Figure 9.4 Beta channel for FEWER

10. Troubleshooting

10.1 Checking FEWER logs for error messages

In the event of an error in the Web system, the FEWER logs can be checked to determine the cause of the error. To view these logs, the following command is executed from the command line interface.

tail -f ~/log/test/mfisheries.log

Note that the path for the log is dependent on the location where FEWER is installed. An example of the executed command and the generated result is shown in Figure 10.1.

```
[mfisheries@v872674 test]$ tail -f ~/log/test/mfisheries.log
2018-05-17 11:01:18,193 - fastkml.config - WARNING - config : 27 - Packag
2018-05-17 11:03:40,509 - fastkml.config - WARNING - config : 27 - Packag
2018-05-17 11:09:27,442 - fastkml.config - WARNING - config : 27 - Packag
2018-05-17 11:13:54,532 - fastkml.config - WARNING - config : 27 - Packag
2018-05-17 11:14:48,360 - fastkml.config - WARNING - config : 27 - Packag
2018-05-17 11:21:55,670 - mfisheries.core.user.registrationhandler - INFO
2018-05-17 11:21:55,670 - mfisheries.core.user.registrationhandler - INFO
2018-05-17 13:28:35,689 - fastkml.config - WARNING - config : 27 - Packag
2018-05-17 13:38:19,424 - fastkml.config - WARNING - config : 27 - Packag
2018-05-17 13:38:26,912 - fastkml.config - WARNING - config : 27 - Packag
```

Figure 10.1 FEWER logs execution

10.2 Checking Apache logs for error messages

In the event of an error in the Web system, the Apache server logs can be checked to determine the cause of the error. To view these logs, the following command is executed from the command line interface Figure 10.2.

sudo tail -f var/log/apache2/error_log

```
[mfisheries@v872674 ~]$ sudo tail -f /var/log/apache2/error_log
[Thu May 17 13:14:23.622658 2018] [mpm_event:notice] [pid 19035:tid 140270064806016] AH00489: Apache/2
al operations
[Thu May 17 13:14:23.622706 2018] [core:notice] [pid 19035:tid 140270064806016] AH00094: Command line:
[Thu May 17 13:28:35.015301 2018] [wsgi:error] [pid 29412:tid 140269462677248] Running the __init__ of
[Thu May 17 13:28:35.690049 2018] [wsgi:error] [pid 29412:tid 140269462677248] 2018-05-17 13:28:35,689
[Thu May 17 13:28:36.292272 2018] [wsgi:error] [pid 29412:tid 140269462677248] [client 209.59.90.206:3
default.py:470: Warning: Data truncated for column 'rssi' at row 1
[Thu May 17 13:28:36.292349 2018] [wsgi:error] [pid 29412:tid 140269462677248] [client 209.59.90.206:3
[Thu May 17 13:38:19.043057 2018] [wsgi:error] [pid 29413:tid 140269504640768] Running the __init__ of
[Thu May 17 13:38:19.424668 2018] [wsgi:error] [pid 29413:tid 140269504640768] 2018-05-17 13:38:19,424
[Thu May 17 13:38:26.553103 2018] [wsgi:error] [pid 29411:tid 140269580175104] Running the __init__ of
[Thu May 17 13:38:26.912341 2018] [wsgi:error] [pid 29411:tid 140269580175104] 2018-05-17 13:38:26,912
```

Figure 10.2 Apache logs execution

10.3 Using Firebase Crashlytics

In the event of an error or crash on the mobile application, the firebase console's Crashlytics can be used to determine the cause of the issue. It can be accessed from the firebase console as shown in Figure 10.3.

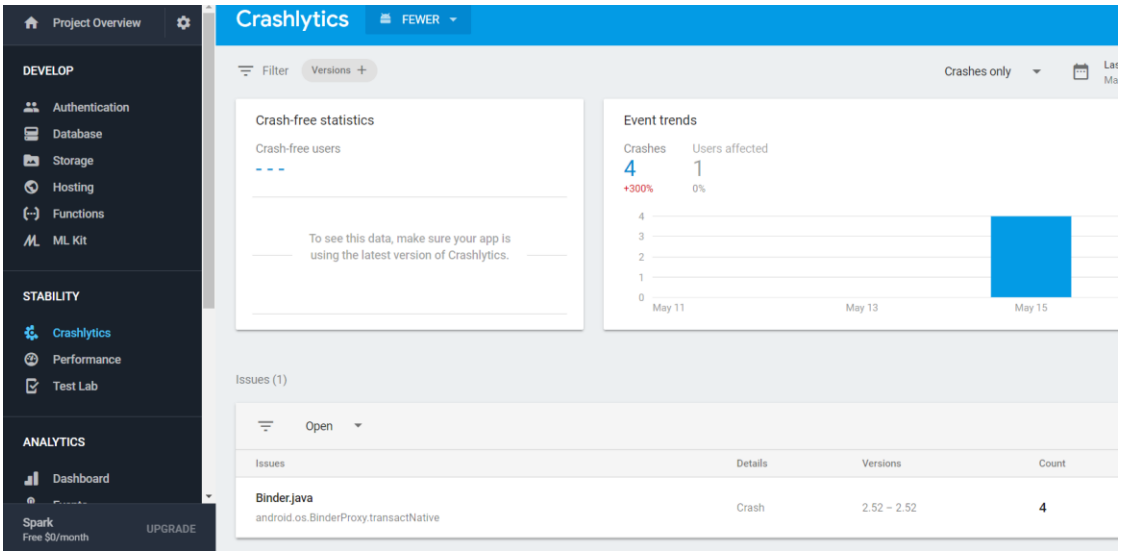


Figure 10.3 Firebase Crashlytics

11. Appendices

11.1 Extractor Manual

The weather module of the FEWER system has the following specifications:

- The system allows country administrators to select and configure the hydro meteorological (hydro-met) information that is included in weather module.
- The system retrieves hydro-met information from the following sources:
    - MET Office websites
        - Dominica
        - Grenada
        - St Lucia
        - St Vincent and the Grenadines
    - Tide information: Extracted from site tide-forecast.com
- The Mobile app displays information based on information retrieved from the web service. It is presented in the form of readings. The available readings are configured via country administrator
- Information is sent between the web services and clients in a structured JSON format.
- Information will be cached (suggested time to live be configured on the back end) using databases for the web services and cached temporarily in the client persistence storage mechanisms.

11.1.1 Add Weather Source

When adding a weather source, a form is displayed to the user as seen in Figure 11.1. The descriptions for each of these forms are shown in Table 11.1.

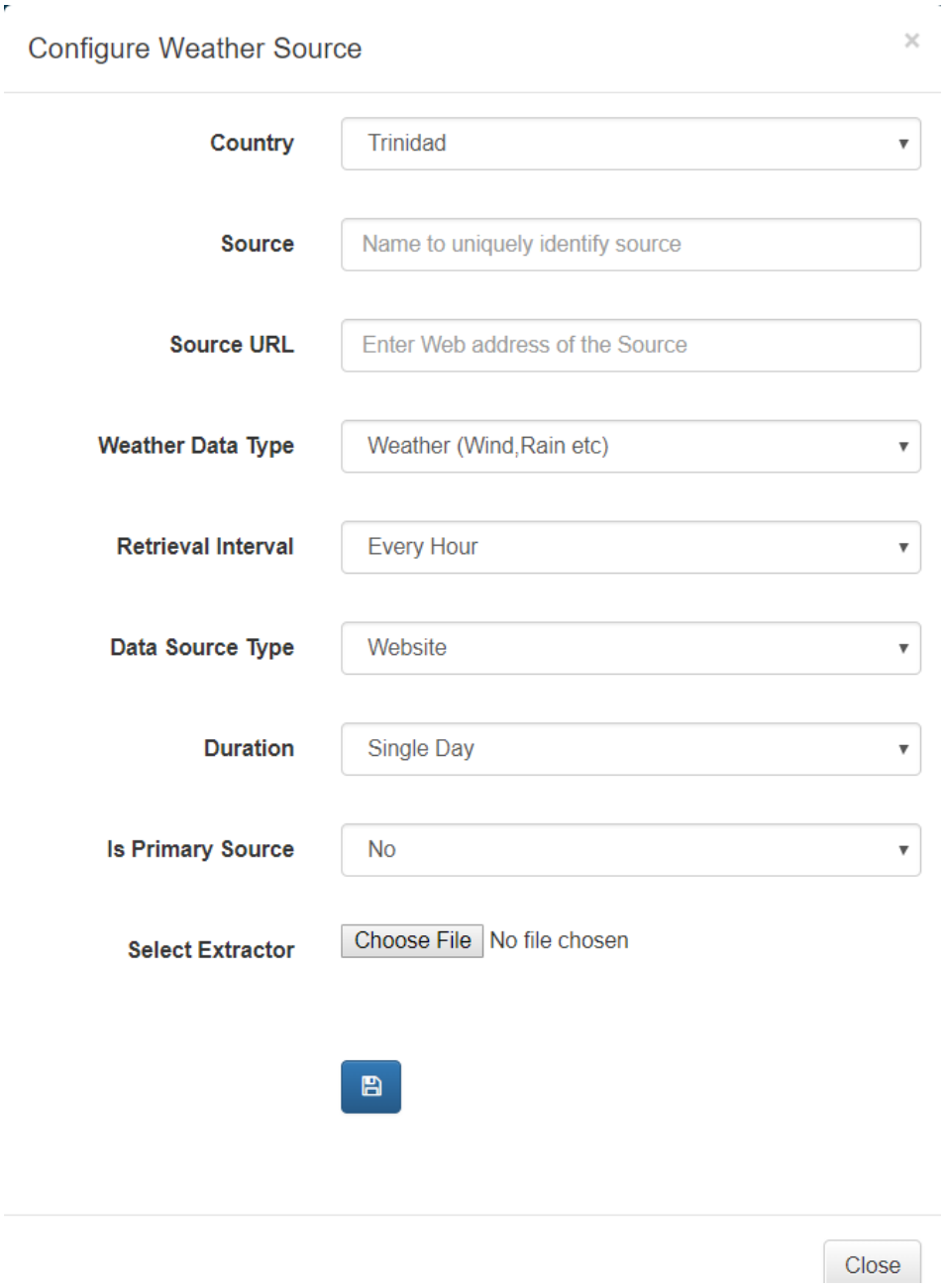


Figure 11.1 Form to configure weather source

The system facilitates the uploading of an extractor procedure. For more details on the creation of an extractor see Section 11.1.6. This procedure will be a standard python class to facilitate a pluggable module.

Table 11.1 Weather Source Form Field Descriptions

Name	Description	Options
Source	Name to uniquely identify a local (Met office etc.) or external (NOAA, OpenWeather etc.) source of weather information	Open-ended text entry by administrator for FEWER in a particular country
Source URL	Web address through which the data is accessible from the named weather source	Open-ended text entry
Weather Data Type	Primary type of data provided by the source	1. Oceanic: tides etc. 2. Weather: wind, rain etc.
Retrieval Interval	Period over which data is updated	1. Every Hour 2. Every six Hours 3. Once per day
Data Source Type	Means through which FEWER accesses the weather data from the named source	1. Website 2. Application Programming Interface (API)
Duration	Period over which the weather data is valid	1. Single Day 2. Forecast
Is Primary Source	Primary source of information to be used for weather alerts	1. No 2. Yes
Select Extractor	Extractor file to be used to programmatically extract data from source	Upload by selecting extractor through file explorer

11.1.2 Configuring Weather Source Thresholds

After adding the source by completing the form and uploading the extractor, the system will load the extractor file and allow the user to configure the threshold values that the extractor supports. An example of the form for configuring the threshold of an extractor is illustrated in Figure 11.2.

The following are additional characteristics of this step:

1. The system reads the extractor file and displays the configurable thresholds specified in the extractor's class.
2. The system via the form, allows the administrator to set threshold values to determine if the system should provide highlighted information for the end-user based on the information provided.
3. If no threshold values are provided, the system interprets that the information in the source should not be interpreted as actionable weather notifications.

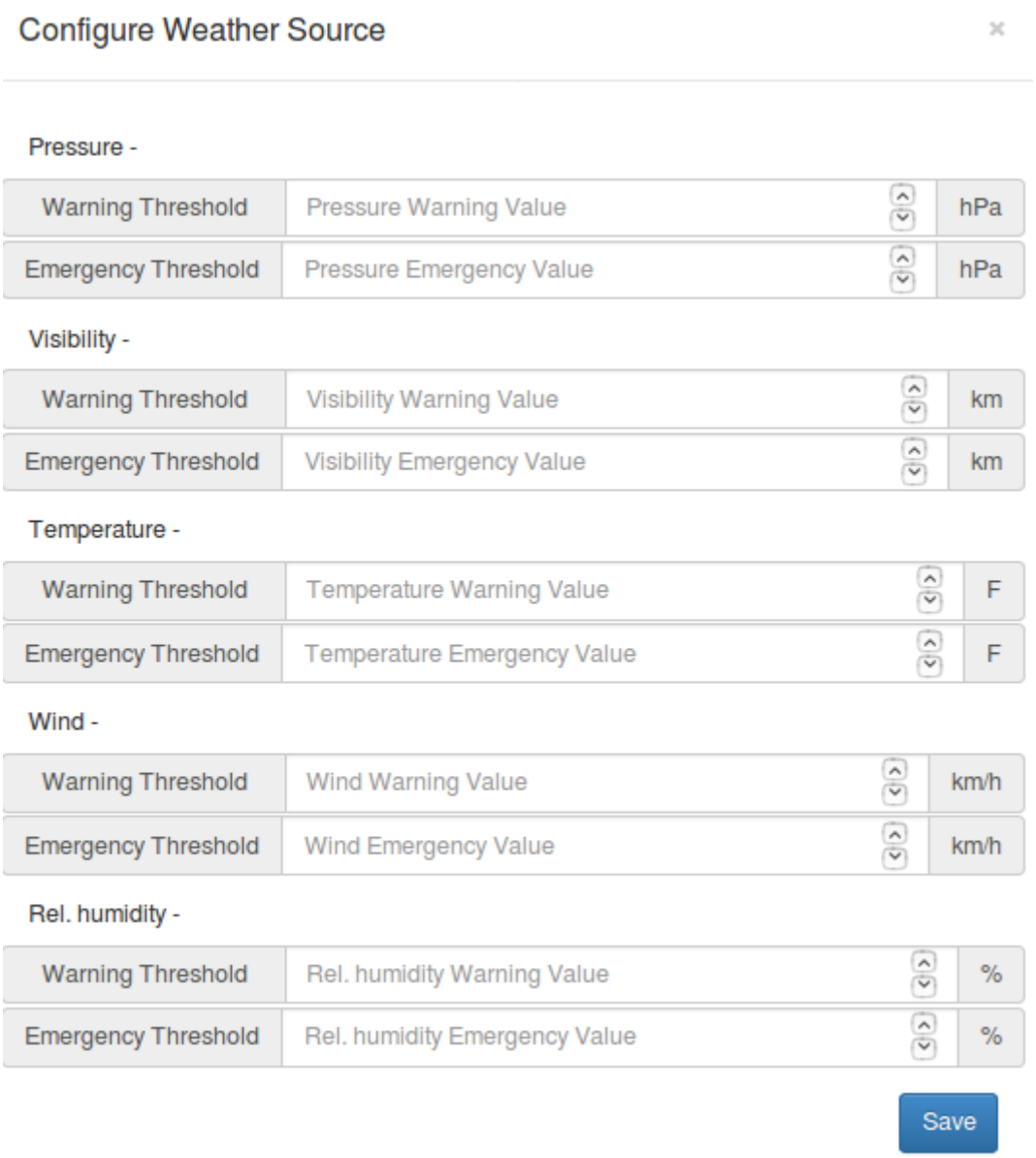


Figure 11.2 Configure thresholds for added data sources

The system flow for retrieving information from different sources is highlighted in Figure 11.3. The following are further details explaining the process.

- The scheduling is facilitated using the OS CRON job. Cron jobs allow the operating system to run tasks at configurable time intervals. The system will run the update every 6 hours. Therefore, the time will scheduler will run at the following times:
    - 6:30 am
    - 12:30 am
    - 6:30 pm
    - 12: 30 pm
- The triggering process will check with the database to determine what extractors will be executed at this interval.
- Each extractor has knowledge about its source details within the module definition.

- When the time condition is met, the extractor is retrieves and stores the weather information to the database and notifies the system that the process was completed successfully.

11.1.3 Weather Data Acquisition Process

FEWER uses extractors to retrieve information from various sources configured. The extraction process is executed as follows

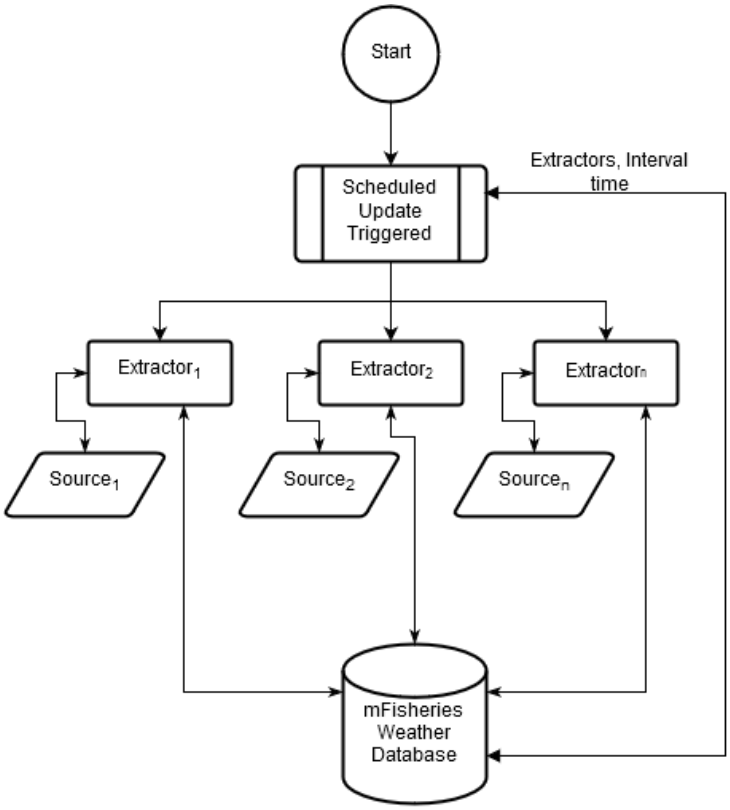


Figure 11.3 Flowchart for updating information from sources

11.1.4 Data Format/Schema for Weather Source

Each extractor generates information in the schema highlighted in Figure 11.4 based on its configured weather source. The scheme influences the JSON (dictionary) schema generated to pass information from the extractor to the system and influences the design of the database tables that will store the retrieved information.

Each entry can have one reading, or multiple readings based on the nature of the source. For example, the MET office data will have multiple readings, one for each of the information provided. More specifically, the extractor can have a reading entry for wind, temperature, rainfall, etc.

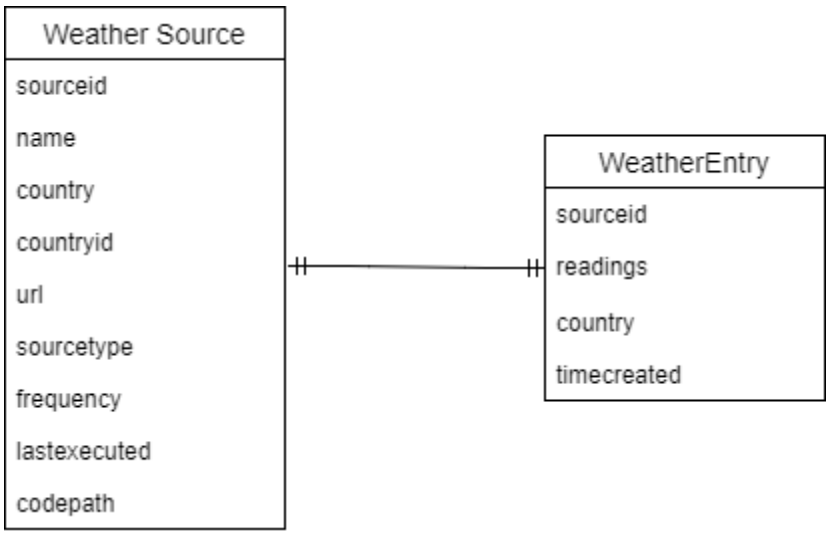


Figure 11.4 Data schema for weather source and reading

11.1.5 Weather Extractor Specification

The extractor module is implemented as a python class based on standard OOP behavioural design patterns. To access the source code for the extractors the following link to a git repository containing the source can be used to clone the repository. Once the repository has been cloned the instructions found in the ReadeMe.md file is to be followed to install the remaining dependencies to run the extractors from the command line interface. The link for the repository is: https://bitbucket.org/ewer_fish/fewerweatherextractors.

11.1.6 Extractor File Structure

Within the repository there exists a file called WeatherSourceExtractor.py that serves as the base class for all weather extractors. Within this file some key methods can be found. The programmer must implement these abstract methods in their extractor's class as shown in Figure 11.5. A description of these methods can be found in Table 11.2.

Table 11.2 Extractor method descriptions

Method	Description
get_poster_url(self)	Retrieves the API link where the extracted readings will be sent.
get_extractor_url(self)	Retrieves the URL that the data will be extracted from.
get_reading_types(self)	This is used to allow the user to configure the threshold readings (JSON format).
extract(self)	This function extracts the weather readings from the URL and returns readings in dictionary format.

```
@abstractmethod
def get_poster_url(self):
    pass

@abstractmethod
def get_extractor_url(self):
    pass

@abstractmethod
def toJSON(self):
    pass

@abstractmethod
def get_reading_types(self):
    pass

@abstractmethod
def extract(self):
    pass
```

Figure 11.5 Extractor Core Methods

11.1.7 Extractor Class Creation

To create and extractor the following guidelines should be followed:

1. Located in fewer/modules/weather/parsers/extractors there exist a file named WeatherSourceExtractor.py.
2. The file is a python class, which provides the structure for the creation of extractor modules.
3. WeatherSourceExtractor.py is an abstract class and the programmer creating the new extractor module must inherit this class in their python extractor module. They must also import some other dependencies such as json, and beautiful soup.
4. Inheriting the WeatherSourceExtractor class ensures that the programmer adheres to the extractor file's structure.
5. The name of the class must be Extractor for it to be integrated into the system as it will be used by factory outlines.
6. The most important function is the **extract()**. The new extractor must implement this in such a way that the extract returns the dictionary of extracted readings from the weather source's URL.
7. The saving of data is covered by the WeatherSourceExtractor class.

An example of the creation of an extractor is shown in Figure 11.6.

```
import json
import re
import requests
from bs4 import BeautifulSoup

try:
    # We are attempting to run via cli within mFisheries application
    from mfisheries.modules.weather.parsers.WeatherSourceExtractor import WeatherSourceExtractor
except:
    # We are attempting to run via cli outside of application
    from WeatherSourceExtractor import WeatherSourceExtractor

class Extractor(WeatherSourceExtractor):
    def __init__(self):
        WeatherSourceExtractor.__init__(
            self,
            "http://meteo.gov.vc/meteo/",

        )

    def get_poster_url(self):
        return self.post_url

    def get_extractor_url(self):
        return self.extractor_url

    def get_reading_types(self):
        return {
            "wind": {
                "type": "text",
                "unit": "km/h"
            },
            "seas": {
                "type": "text",
                "unit": "m"
            }
        }

    def extract(self):
```

Figure 11.6 Extractor File Example

As shown in the above figure the programmer has a few dependencies to import into the extractor being created, namely the WeatherSourceExtractor class. When the Extractor class is declared there is also the **__init__(self)** method. This method comes from the **__init__()** method of the WeatherSourceExtractor class which is shown in Figure 11.7.

The **init** method of the WeatherSourceExtractor class takes in two arguments, self and a string called "extract" which represents the URL from which the data will be extracted from.

```
def __init__(self, extract=""):
    self.extractor_url = extract
    self.readings = {}
```

Figure 11.7 __init__ Method of Extractor class

It is also important to note the implementation of the default methods of the WeatherSourceExtractor class. This is how they will be declared in all the weather extractors. Figure 11.8 shows the different methods of an extractor. The only extractor method not shown in Figure 11.8 is the **extract()** method. Further details of the extract method are highlighted in the next section.

```
def get_poster_url(self):
    return self.post_url

def get_extractor_url(self):
    return self.extractor_url

def get_reading_types(self):
    return {
        "wind": {
            "type": "text",
            "unit": "km/h"
        },
        "seas": {
            "type": "text",
            "unit": "m"
        }
    }
```

Figure 11.8 Extractor Methods

11.1.8 Configuring the Extract Method

The extract method will differ for each extractor as it will depend on the structure of the HTML of the website that the weather information is going to be extracted from. We will use the MET Office website for St Vincent as an example as shown in Figure 11.9.

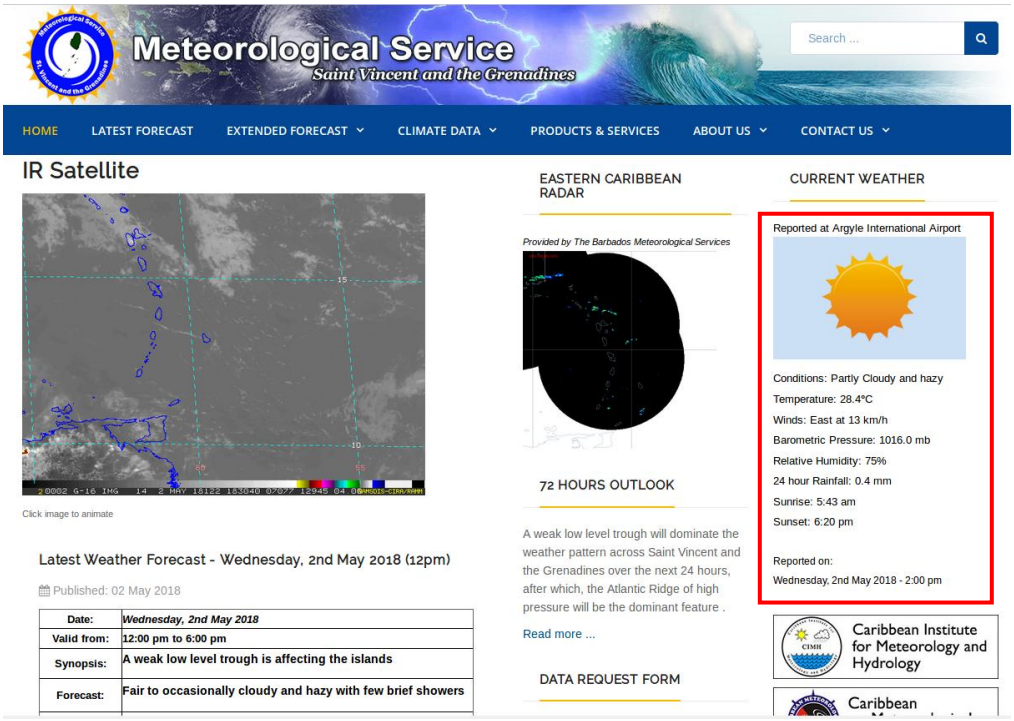


Figure 11.9 Saint Vincent and the Grenadines MET Office website

The information we want to extract it shown in the red shape. For us to be able to extract this information easily we need to know how it is structured in the web page first. To do this can right click on the area and select “Inspect Element” from the menu. This will bring up a window showing us the HTML structure of the element we selected as seen in Figure 11.10.

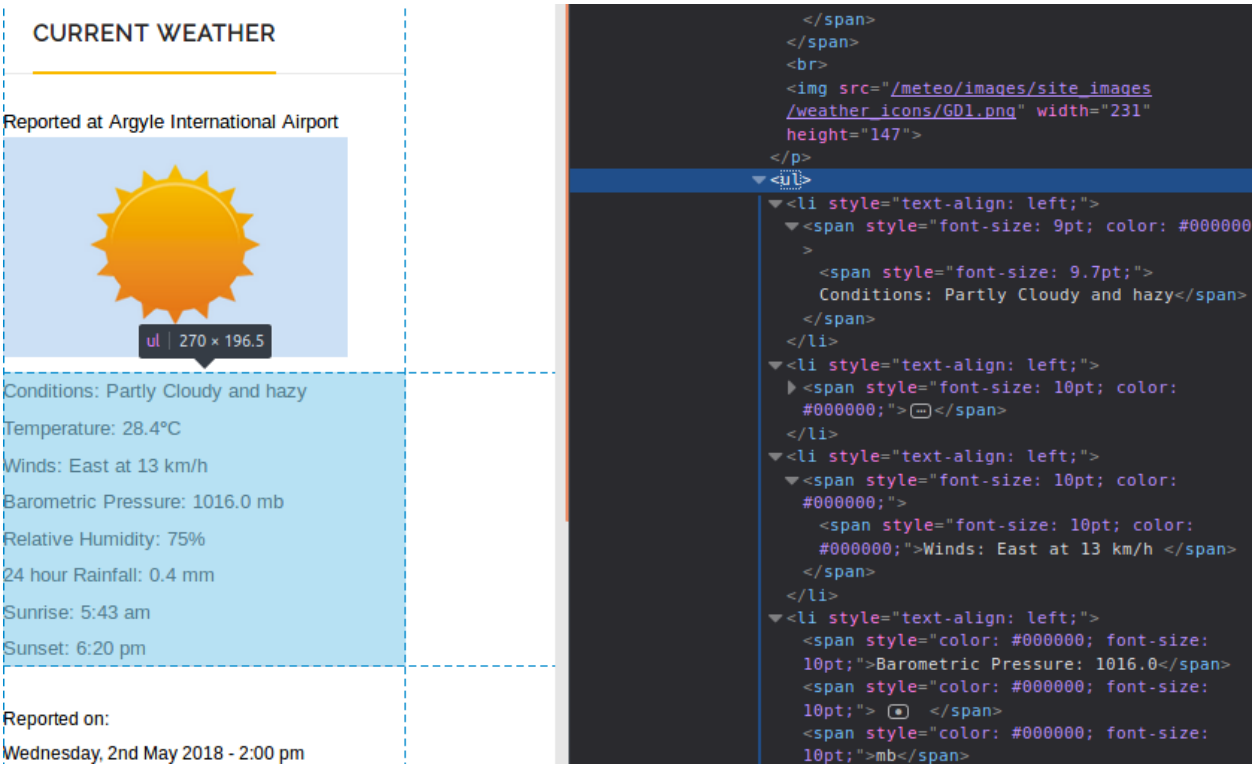


Figure 11.10 Inspecting the HTML for the section we want to extract

From this we can see that the information we want is within an unordered list tag “<ul>”. Now we can configure the extract method to find all <ul> tags and store the information within those tags as seen in Figure 11.11.

```
def extract(self):
    headings = []
    self.readings = {}
    print("Extracting current info from Saint Vincent MET")
    r = requests.get(self.extractor_url)
    print("Retrieved home page")
    soup = BeautifulSoup(r.content, "html.parser")
    data = soup.find_all("ul")
```

Figure 11.11 Storing all information between the ul tags

This does not specify the data between those tags but instead stores them all as a list. What we need to do now is go through that list and find the information we want an example of looking for something specific is shown in Figure 11.12.

```
    soup = BeautifulSoup(r.content, "html.parser")
    data = soup.find_all("ul")
        save =""
        for row in data:
    # takes the block of text with readings alone. the ul has other unrelated stuff we didnt need
            if "Temperature" in row.text:
                save = row.text
                break
```

Figure 11.12 Specifying what we are looking for.

Once we have we want we store it into a variable containing all the readings. We save it as a json object meaning each reading is stored as a key and a value. Once we have this variable we convert it to JSON

using the **toJSON(self):** method and return the readings as shown in Figure 11.13. Once we have done this we declare the main of the file and call the extract method in it also seen in Figure 11.13.

```
53          for current in save.strip().split("\n"):
54              self.readings[current.replace(u'\xa0', u' ').split(": ")[0]] = current.replace(u'\xa0', u' ').split(": ")[1]
55
56          return self.readings
57
58      def toJSON(self):
59          return json.dumps(self.readings)
60
61
62  # Can be executed directly using the command python -m mfisheries.modules.weather.parsers.StVincent
63  if __name__ == "__main__":
64      country = Extractor()
65      country.extract()
66      print country.toJSON()
```

Figure 11.13 Finishing the Extractors extract method

11.1.9 How the system works

The python APScheduler together with the use of OOP data structure, factory, were used to make this module functional.

- **Python APScheduler** – This is responsible for checking the weather sources frequency time and running the scheduler if the time criteria are met. This runs when the server starts to schedule the extractor to be executed. scheduler.py. An example of the scheduler is shown in Figure 11.14.

```
def schedule():
    get_url = 'http://mfisheries.herokuapp.com/api/weathersources'
    try:
        r = requests.get(get_url)
        database = r.json()
        sched = BackgroundScheduler()
        for entry in database:
            if DEBUG:
                print entry
            filename =  entry['codepath'].split('/').pop().split(".py")[0]
            loop = frequency[entry['frequency']]
            id = entry['id']
            my_class = factory.factory(filename)
            if DEBUG:
                print my_class.extract()
            job = sched.add_job(my_class.save,'interval', hours = loop ,kwargs={'sourceid': id})
            if DEBUG:
                print job
        sched.start()
        if DEBUG:
            print "Extractors Scheduled Successfully"
    except Exception, e:
        print e
```

Figure 11.14 Python Scheduler

- **Factory** – This is simply a python file used to detect all extractor classes for the use of the scheduler. The file name of the extractor e.g. DominicaExtractor.py excluding the python extension, is used by the factory to know which extractor should be scheduled. Once the new extractor files are placed in the extractor folder i.e. fewer/modules/weather/parsers/extractors the factory will automatically configure the scheduler to read them. The Extractor() function creates an instance of the object. An example is shown in Figure 11.15.

```
def factory(type):
    packages = packagenames()
    if type in packages:
        return eval(type +"." + "Extractor()")

    assert 0, "Bad object creation: " + type
```

Figure 11.15 Python Factory

11.1.10 Weather Notification

The weather notification is created based on threshold the threshold values set by the administrator for the weather readings. A user is automatically subscribed to weather notifications once they install the weather module of the mFisheries mobile application. on their device. These notifications are sent to users based on their country's weather. Notifications are sent once a day regardless of when the user registers on the mFisheries application.

What triggers a notification?

1. A notification is triggered when a new weather reading is greater than or equal to its corresponding threshold value
2. One day has passed since the old notification was sent and the threshold condition is still met
3. When the extractor file is executed via the scheduler or the manual run and the weather readings are greater than or equal to their corresponding threshold values

11.2 Specifications for Software and Equipment for FEWER deployment

As discussed on a number of occasions between the ICT4Fisheries Consortium and FEWER implementing agencies, including meetings held for this purpose on 14 February and 8 March 2018, FEWER deployment requires specific hosting provisions. This document specifies the corresponding requirements in accordance with *Section 3.1(e) Scope of Services, Tasks (Components) and Expected Deliverables* of Contract No. CF14/C4.02-3 of the PPCR Regional Track, TC No.: ATN/SX-14969-RG: "… specifications of any required additional software and equipment and assisting with sourcing the requisite quotations to facilitate procurement by the IPCR PMU".

11.2.1 Scope and Assumptions

While FEWER has been developed for Grenada, Dominica, Saint Lucia and St. Vincent, Dominica has not yet fully recovered from Hurricane Maria in 2017 and is therefore expected to come on stream after the conclusion of PPCR Regional Track Contract No. CF14/C4.02-3. It has been agreed that FEWER will be regionally hosted. The scope of specifications captured in this document is therefore limited to the requirements for regional, rather than local, hosting. Administrator access from each country instance requires only a standard desk-top machine, outfitted with a web browser and reliable, high speed internet connection. The recommended browsers include the latest version of Chrome, Firefox, Microsoft Edge and Safari for MacOS users. These are assumed to already be in place and otherwise used by the respective country and agency administrators for their regular duties.

In jurisdictions which support dissemination of FEWER alerts via a free Short Message Service (SMS), subscription to a software service such as Twilio is additionally required. Waivers of such costs may be negotiated at the country or regional levels. This service and the related costs are optional and not considered for the baseline nominal deployment. The relay of FEWER CAP alerts to marine band VHF radio is only assumed to be supported in jurisdictions which already have the appropriate hardware and software installed within their national CAP infrastructure. No associated costs are included in the specifications of required software and equipment for FEWER deployment.

11.2.2 Hosting Requirements

The methodology and requirements for regional hosting have been specified on the basis of discussions held between the ICT4Fisheries Consortium and CDEMA's Information & Communications Technology Manager, Mr. Oronde Lambert, over a series of meetings conducted specifically for this purpose. It was agreed that for nominal operations, only software and related remote hosting services are required while for redundancy and backup, additional hardware and associated services are recommended. Table 11.3 provides an overview of the cost required for the nominal and full hosting of the FEWER solution. Table 11.4 summarizes the requirements for nominal FEWER hosting while the Appendix provides the respective dimensioning. Table 11.5 provides costing for the optional use of an SMS service. Table 11.6 summarizes draft recommendations for redundancy and backup software while Table 11.7 does so for redundancy and backup hardware and networking services. It is recommended that the provisions captured in Table 11.3 are initiated at this time to ensure that FEWER hosting is deployed by the end of the contract, May 2018.

Table 11.3 - Summary of Cost for FEWER deployment

Service	Option	Nominal FEWER (USD)	Full Cost with Backups (USD)
Hosting Services	Digital Ocean	480	480
Domain Name	Namecheap	25	25

Service	Option	Nominal FEWER (USD)	Full Cost with Backups (USD)
SSL Certificate	Namecheap	95	95
Real-time comms service	Firebase	300	300
Weather API	Openweathermap.com		480
Tides API	tide-forecast.com	0	
SMS Service Subscription	twilio.com		312
Database replication software	Percona XtraBackup	0	
File resources backup	Bacula	0	
Network Attached Storage (NAS)	Rackstation		2,900
NAS HDD	Western Digital		1,620
NAS Sliding Rails Kit	Synology		116
Server	Dell R330		2,000
Server HDD	Western Digital		140
Server Sliding Rails Kit	Dell		125
Power Supply	Dell		400
	Total	900	8,993

The nominal configuration is the minimum set of resources required to make the FEWER solution available. The nominal solution is extended with hosting and backup services provided by CDEMA to represent the full deployment of FEWER. The full solution involves the hosting of FEWER in a cloud-based service provider and the back-up facilities configured in CDEMA's data center.

Table 11.4 - Requirements for Nominal FEWER Operations

Software Service	Description / Purpose	Particulars	Options & Yearly Cost, US$	Recommendation
Hosting Services	Store web application code and other resources e.g images, video and related files generated from web and mobile application use.	Same server can provide hosting for FEWER and CAP tools needed to generate FEWER alerts and forward national CAP alerts	Hostpapa: 1800	
			Digital Ocean: 480	✓
			Azure: 840	
Domain Name	The name (URL) that users enter via the web browser to access FEWER dashboards	Unique name needed for FEWER and CAP. CAP tools name can be a 'sub-domain' of FEWER for e.g. if FEWER is https://fewer.fish then CAP tools can be located at https://cap.fewer.fish	**Namecheap: 25**	✓
			GoDaddy: 40	
			DreamHost: 35	
SSL Certificate	Provides security (encryption) for communication between the web and mobile applications in FEWER. Facilitates use of https in the website's URL	Cost depends on domain name configuration. With recommended strategy, SSL certification to cover sub-domains is required. Otherwise, an SSL certificate for each name is required	**namecheap: 95**	✓
			Thawte.com: 745	
			Comodo.com: 500	
Real time comms	Enables real time communication between mobile & web applications required, e.g. Alerts, Messaging & Delivery confirmation.	These services generally have a free and paid tier, with payment required when more than allocated free quota is used.	**Firebase: 300**	✓
			Azure: 120	
			Back4App: 420	
Weather API	Provides current and forecasted readings in weather module	These services generally have a free and paid tier, with payment required when more than allocated free quota is used.	**Openweathermap.com: 480**	✓
			Accuweather.com : 108	
			Darksky.net: 324	
Tides API	Provides current & forecasted tide readings in weather module	These services generally have a free and paid tier, with payment required when more than allocated free quota is used.	World Tides: 60	
			Tide Forecast: 0	✓
			Weather Underground: 0	

Table 11.5 - Requirements for Optional FEWER Operations

Software Service	Description / Purpose	Particulars	Options & Yearly Cost, US$	Recommendation
SMS Service Subscription	Used to enable a 3rd Party SMS service provider for sending notification of CAP alerts to non-Android FEWER users	Cost is associated with the acquisition of a number and the number of requests made in a month.	**Twillio: 312**	✓
			Nexmo: 116	
			Sinch: 104	

Table 11.6 - Recommendations for Redundancy and Backup: Software Services

Software Service	Description / Purpose	Particulars	Options & Yearly Cost, US$	Recommendation
Database Replication	Assist with the replication of database on backup system	Cost associated with the acquisition of software services required to automatically manage the operations of scheduling database retrieval and synchronization.	**Percona XtraBackup: 0**	✓
			MySQL Enterprise Backup: 5000	
			SymmetricDS: 2500	
File resources backup	Assists with the replication of the images, video and other resources generated by fishers' interaction with FEWER	Cost associated with acquisition of software needed to automatically archive and store files on a remote server.	**Bacula: 0**	✓
			Urbackup.org: 0	

Table 11.7 - Provisional Recommendations for Redundancy and Backup: Hardware and Networking Services

System Components	Description / Purpose	Options & Yearly Cost, US$	Recommendation
Rackmount Network Attached Storage (NAS)	Allows the mounting of the hard drives and storage within the CDEMA server environment	Netgear: 1,000	
		RackStation RS2416RP+: 2,900	✓
		QNAP: 1,300	
NAS hard disk drives (HDD)	The hard disk for storing additional files and database backup. The system uses 6 hard drives for RAID to mitigate against hard drive failure.	Seagate Barracuda (8TB): 1200	
		Seagate (8TB): 1,458	
		Western Digital Red (8TB) : 1620	✓
NAS Sliding Rails	Enable the easier integration and management of the NAS into the server rack.	Synology RKS1317 Sliding Rail for 1U/2U Models: 116	✓
		QNAP Rail kit: 110	

System Components	Description / Purpose	Options & Yearly Cost, US$	Recommendation
		Synology RKS1314: 290	
Server	The computational component of the system that will process the requests generated by the web and mobile clients.	DELL R330 PowerEdge 2,000	✓
		DELL R230 PowerEdge 1U 1,600	
		DELL R640 EMC PowerEdge 3,300	
Power Supply	Two redundant Hot-swappable power supply for the server and NAS components. This component supplies electrical power to the devices used to host the application	NETCNA PE hot Swap 800	
		DELL Y8Y65 350W 400	✓
Server hard disk drives (HDD)	The hard disk for storing additional files and database backup. The system uses 2 hard drives for RAID to mitigate against hard drive failure.	Seagate Barracuda (1TB): 100	
		Seagate (1TB): 150	
		Western Digital Red (1TB): 140	✓
Server Sliding Rails	Enable the easier integration and management of the NAS into the server rack.	Tekboost: 120	✓
		Dell kit: 125	

11.2.3 Appendix I Service Dimensioning & Comparative Costing

11.2.3.1 Weather API Dimensioning & Comparative Costing

Dimensioning for 1000 fishers at 10 calls to the Weather API per fisher per day, total dimensioned calls per month (30 days) = 300,000.

Table 11.8 – Weather API comparative costing

API	Free Limit per month	Unit Cost	Expected # Calls	Total Cost Per Month	Total Cost Per Year
1. Darksky	30,000	0.0001	300,000	27	324
2. Accuweather	225,000	0.00012	300,000	9	108
3. OpenWeatherMap	2592,000	40	300,000	40	480

11.2.3.2 Real Time Communications Dimensioning & Comparative Costing

Dimensioning for 1000 fishers at 20 calls to the Tides API per fisher per day, total dimensioned calls per month (30 days) = 600,000.

Table 11.9 – Realtime communication comparative costing

API	Monthly Cost	Yearly Cost
Back4App	35	420
Azure	10	120
Firebase	25	300

11.2.3.3 Hosting Dimensioning & Comparative Costing

Dimensioning for FEWER server at Quad-Core CPU (Xeon or comparable), 6GB RAM, 100 – 200GB with the following services: Apache HTTP Server, MySQL Database (or compatible RDBMS), PHPMyAdmin, cPanel.

Table 11.10 – Hosting comparative costing

API	Monthly Cost	Yearly Cost
Hostpapa	150	1800
Digital Ocean	40	480
Azure	70	840

11.2.3.4 Optional SMS Service Dimensioning & Comparative Costing

Country dimensioning is based on sending 1 SMS message to 200 fishers every month.

Table 11.11 – SMS service comparative costing

API	Unit Cost (US$)	Estimated Yearly Cost (US$)	Total Yearly Cost(US)
Twillio	Dominica – 0.0498 Grenada – 0.0550 Saint Lucia - 0.0510 SVG – 0.0550	Dominica – 119.52 Grenada – 132.00 Saint Lucia - 122.40 SVG – 132.00	505.92
ExpertTexting	Dominica – 0.0172 Grenada – 0.0141 Saint Lucia - 0.0142 SVG – 0.0142	Dominica – 41.28 Grenada – 33.84 Saint Lucia - 34.08 SVG – 34.08	143.28
Clickatell	Dominica – 0.1056 Grenada – 0.1691 Saint Lucia - 0.15002	Dominica – 253.44 Grenada – 405.84 Saint Lucia - 360.05	1327.01

API	Unit Cost (US$)	Estimated Yearly Cost (US$)	Total Yearly Cost(US)
	SVG – 0.1282	SVG – 307.68	
SMS API	Dominica – 0.037 Grenada – 0.037 Saint Lucia - 0.037 SVG – 0.037	Dominica – 88.80 Grenada – 88.80 Saint Lucia - 88.80 SVG – 88.80	355.20

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