Guide to Monitoring Real-time Marine Mammal Detections using Autonomous Platforms

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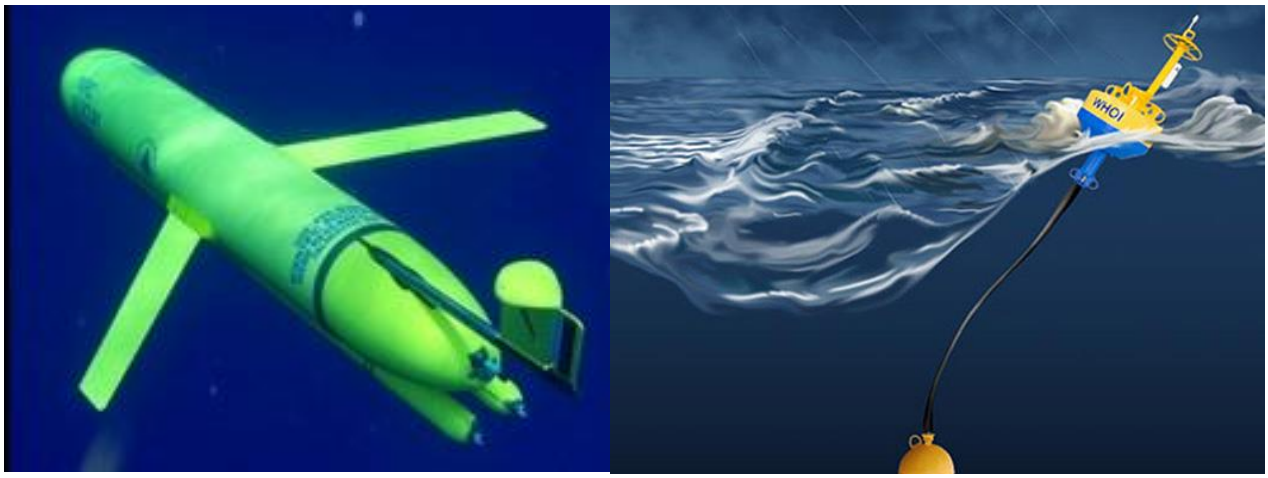

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Introduction

Background

The low-frequency detection and classification system (LFDCS) is a system to detect the calls of marine mammals written by Mark Baumgartner at WHOI. It analyzes acoustic data, traces frequency modulated signals (pitch tracks), and compares attributes of these signals to a reference library of species-specific call types (e.g., fins, humpbacks). For near-real-time applications, the LFDCS runs on the digital acoustic monitoring (DMON) instrument, which has integrated hydrophones for collecting, processing, and recording audio.

When autonomous real time detections are occurring from gliders, moorings, etc., detections are uploaded onto Mark's **Autonomous Real-time Marine Mammal Detections** webpage (http://dcs.whoi.edu/) under **Active Studies**, then the project's title. Detections are reported in tables, figures, and pitch tracks which can then be reviewed by an analyst.

For more information, please refer to Mark's main page on his website. Links to his papers and description of the platforms/software can be found there.

Reference Study

If at any point in time you have a question about a call type, or how to classify a detection, please refer to the *Roseway Basin, Southwestern Scotian Shelf, Canada, Summer 2014* study, as that was all annotated by Mark.

Purpose

The purpose of this document is to outline a procedure to be followed when evaluating near real-time pitch tracks. Examples will be based on the *Roseway Basin, Southwestern Scotian Shelf, Canada, Summer 2014* project, as that was annotated by Mark. The hope is that this document will help to standardize the evaluation process between analysts for future real-time detection projects.

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Getting Started

Active Studies: Your Project

On the main page of the website, click on your project's title. This can be found under the **Active studies** section at the top of the page. Each project's main page may look a little different depending on the purpose of the project. Since we are focusing on evaluating incoming detections, we are going to ignore other sections of the page and focus on the **Real-time Whale Detections** section of the project's page. Under the **Real-time Whale Detections** section will be a list of all the platforms that are being used for that project. Clicking on any of those platforms will bring you to the data for that platform.

Species call counts

The **Species call counts** section will display a time series of automatically detected and classified calls over the course of the study. These *do not* reflect analyst verified calls.

Glider track

The **Glider track** section shows a map of where the glider is currently and where it has been. The date/time listed under **Last** tells you the timestamp of the last upload from the platform in local time.

Mapped call counts

The **Mapped call counts** section shows maps of where calls that were automatically classified as a particular species are located along the trackline (for gliders).

Background noise

The **Background noise** section shows a long-term spectrogram of the audio.

Daily tally tables

The **Daily tally tables** section is what you as an analyst will be using the most. The incoming data is separated by days, and you can access data from a particular day by clicking on the link. The data for the current day will be displayed right there on the project page (without a day link).

Each row in the table corresponds to a nominal 15-minute summary period, and the date/time displayed for a row corresponds to the date/time of the end of the 15-minute period (in local time). This is followed by the number of calls the DMON/LFDCS has classified per species. There is also an "Other" column for those sounds that did not match any calls in the call library. The "Duration" column refers to the duration in the summary period (in seconds); this should typically be 900 seconds (15 minutes) unless pitch tracking was turned off for a glider surfacing (Slocum glider only) or the DMON audio was muted to assess noise conditions and produce a time mark in the audio recording. The "Tracks" column will show you which summary periods contain pitch track information (noted by a "PT"). Note that a maximum of 8 KB of pitch track data per hour is transmitted to shore via Iridium satellite to minimize cost, so not all summary periods have associated pitch track data available. To evaluate a summary period with pitch tracks, click on the "PT" link; this is further explained in the Using the "Pitch Track" Page section of this document. If there is a "Map" and "Latitude/Longitude" columns, those will indicate the position of the glider at that particular point in time.

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Evaluation Procedure

Using the "Pitch Track" Page

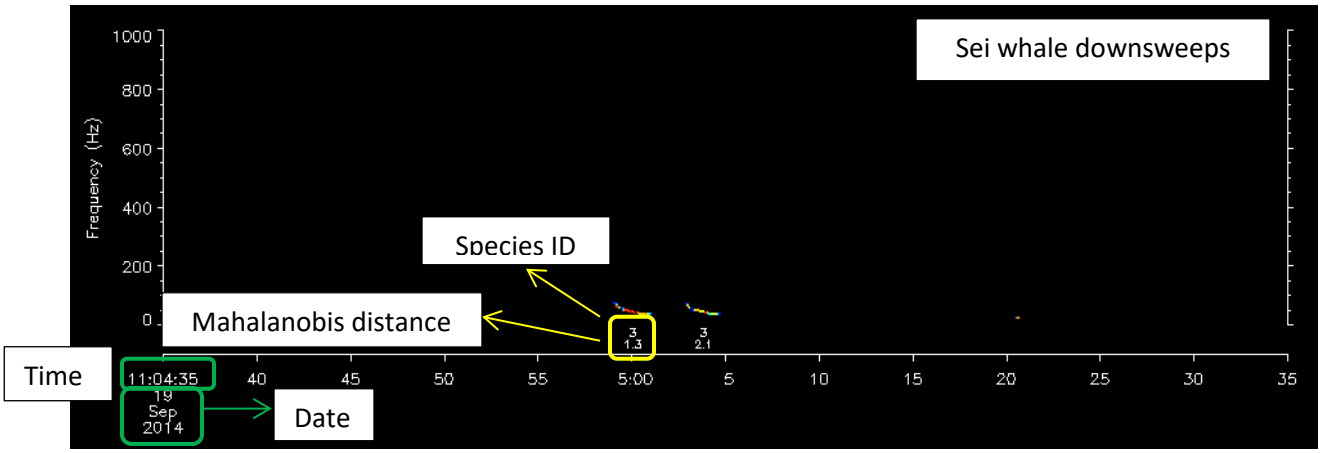
Click on the first "PT" in the tally table. This will bring you to a page that will have pitch tracks for that summary period (henceforth known as the "Pitch Track" page). The transmission time information and species counts will be displayed at the top of the page (which is identical to the row from the tally table). Next you should see fifteen 1-minute figures containing the pitch tracks. There may be dotted vertical lines with a code above that will indicate when pitch tracks are being generated or transmitted by the DMON/LFDCS. The codes and their definitions are as follows:

- MUTEON: the hydrophone is muted to assess system noise and to provide a time mark in the audio recording.
- MUTEOFF: the hydrophone is unmuted and normal recording has resumed.
- ADDET_OFF: a maximum of 8 KB of pitch track data per hour is transmitted by the glider. The ADDET_OFF message indicates that this limit has been reached.
- ADDET_ON: transmission of pitch track data has resumed.
- $ADRUN, 0: the glider has reached the surface and will begin data transmission home, so pitch tracking is terminated (Slocum glider only).
- $ADRUN, 3: the glider has finished data transmission at the surface and is initiating a dive, so pitch tracking has resumed (Slocum glider only).

There may be a portion of the 1-minute figures that appear as gray boxes in association with some of the codes. *Any pitch tracks that appear within the gray boxes should be disregarded during the analysis*, as they may be duplicate data that appear in previous or following periods. To prevent scoring the same data twice, only use pitch track data in the black areas to score periods for species presence.

The pitch tracks will be color coded, where cooler colors (blue) represents quieter signals and warmer colors (red) represents louder signals. Sounds that the DMON/LFDCS classifies as a known call type (from the call library) will have two white numbers displayed below the call. The top number represents the species ID and the bottom number represents the Mahalanobis distance. The latter is not typically used in the evaluation process, but the former is very important. For the northeast United States call library, the species call types are as follows:

- Sei whale downsweep: call types 1-3
- Fin whale 20-Hz pulse: call type 4
- Right whale upcall: call types 5-8
- Humpback whale (various calls): call types 15-20
    - Note that call type 17 is a low-frequency humpback downsweep very similar to a sei whale downsweep.



If you want to know what the species IDs are for your project, go to any Pitch Track page and scroll down to the bottom. Mark has written down the species IDs and vertical line codes (which have been copied onto this document).

Below the pitch tracks is the form that will be filled out after reviewing the pitch tracks. There are 3 choices per species, “Detected”, “Possibly detected”, and “Not detected” (default). When to assign a category to a species is covered in the Determining Species section of this document. Below the table is a text field (“Notes”) where you can enter comments about what you observed. Things to write down include unknown signals that could be of interest, signals that could belong to a species but there was not enough evidence to label as “Possibly detected”, and documentation (evidence) of species presence. Essentially, you would want to have notes of the times of interest such that once the platform is out of the water and the data are back at the lab, you can go through the spectrograms and listen to signals to confirm/reject what you originally thought it was.

Once you have completed the form, click on the “Submit” button. This will prompt you for a username and password. Each analyst will receive their own unique username and password. You will only be prompted for these credentials once during a session.

Once the form has been filled out and you click the “Submit” button, the website will bring you to the next Pitch Track page. You can also maneuver between Pitch Track pages by either the “Back” or “Next” buttons at the bottom of the page. If you want to change a previous form submission, just navigate to that Pitch Track’s page, re-fill the form, and press “Submit”.

Determining Species

The biggest thing to keep in mind is to *be conservative* when determining the detection of a species. Four main criteria exist for determining species from pitch track data: amplitude, shape, isolation, and classification. However, each species require different variations of these criteria for it to be considered "Detected" or "Possibly detected". The following sections describe the main criteria and the specific criteria used for determining the detection of each species. If you are still in doubt, please refer to the Roseway Basin study to see how Mark has classified his pitch tracks.

The Four Main Criteria for Determining Species

- Amplitude of the signal
- Shape of the pitch track
- Isolation from other pitch tracks (context)
- Species classification based on the detector's call library

Amplitude

The amplitude of a signal (i.e., how loud or quiet it is) can sometimes be helpful in assessing pitch tracks. Faint (blue) pitch tracks can be produced either by faint whale calls or in some circumstances, by noise. For example, spurious pitch tracks can be produced by the low-frequency whooshing sound produced by breaking waves as a Slocum glider nears the surface. On rare occasions, these spurious pitch tracks can resemble actual whale calls. These pitch tracks are often quiet, so quiet calls should always be eyed with some suspicion. However, use the criteria described in the following sections of this document for each species and if the context, pattern, or accompanying calls lead you to believe a quiet call is genuinely produced by a whale, then score it as such. Loud tonal frequency modulated sounds that are not at the very base of the spectrogram, in contrast, are typically not spurious and they are usually well pitch-tracked. These should be viewed with much less suspicion.

Shape

The shape of a pitch track can be used to assess whether it is a true call or just noise. A call is easier to identify if it has "good shape", meaning it is smooth and/or has a form that is characteristic of the species in question. A pitch track that has poor shape may be broken or jagged. Sometimes the pitch tracks will have straight lines connecting it to other calls or noise. This is because the algorithm that produces the pitch tracks believes that those two sounds belong together, even if they do not. When this happens, we will use the term "artifact". These artifacts can distort pitch tracks and make it difficult to determine whether the call is real or if it is just noise. Examples of artifacts are shown in the Humpback whale: Possibly detected section of this document.

Isolation or context

The degree of isolation of a call from spurious pitch tracks or calls made by another species can be helpful in determining its source. Usually assessing the 5 seconds before and after the call can clue the analyst into possible noise or biological sources that could have produced a deceiving pitch track. For example, if the call is surrounded by pitch tracks that look relatively similar and appear to be produced by random noise, the analyst should be more skeptical.

In other cases, it may be helpful to assess longer periods of time surrounding the call. Analyzing a full minute before and after a call or occasionally the entire 15-minute period can provide contextual information about

other species present in the area that may be producing similar calls. For example, if there is a potential right whale upcall but humpback calling is also observed in the same period, the analyst should be cautious and assess whether the upcall appears to be "in-rhythm" with the humpback song pattern or similar to calls that are in pattern, or whether it is sufficiently isolated and dissimilar to be considered as a right whale. This situation is further described in the Right whale: General section of this document.

Species classification (Species ID)

If the call has been classified by the DMON/LFDCS classification system and assigned a Species ID number (see the Using the "Pitch Track" Page section), that classification can be used to support whether a species is present or not. For sei, fin, and right whales, a summary period can be scored as "Detected" only if there are one or more classified calls. If there are no classified calls for these species, then only "Possibly detected" or "Not detected" can be scored. This is not true of humpback whales, however, since humpback calls change often and are typically not well represented in the call library.

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Sei whale

Quick guide

	LFDCS Classified (Y/N)	Pattern	Context	Number of calls needed
Detected	Y	Doublets/triplets	If humpbacks present, exercise caution	3+ classified singles or 1+ classified within doublet/triplet
Possibly detected	Y	No observed pattern	If humpbacks present, exercise caution	1-2 classified singles
Not detected	N	NA	N/A	NA

General

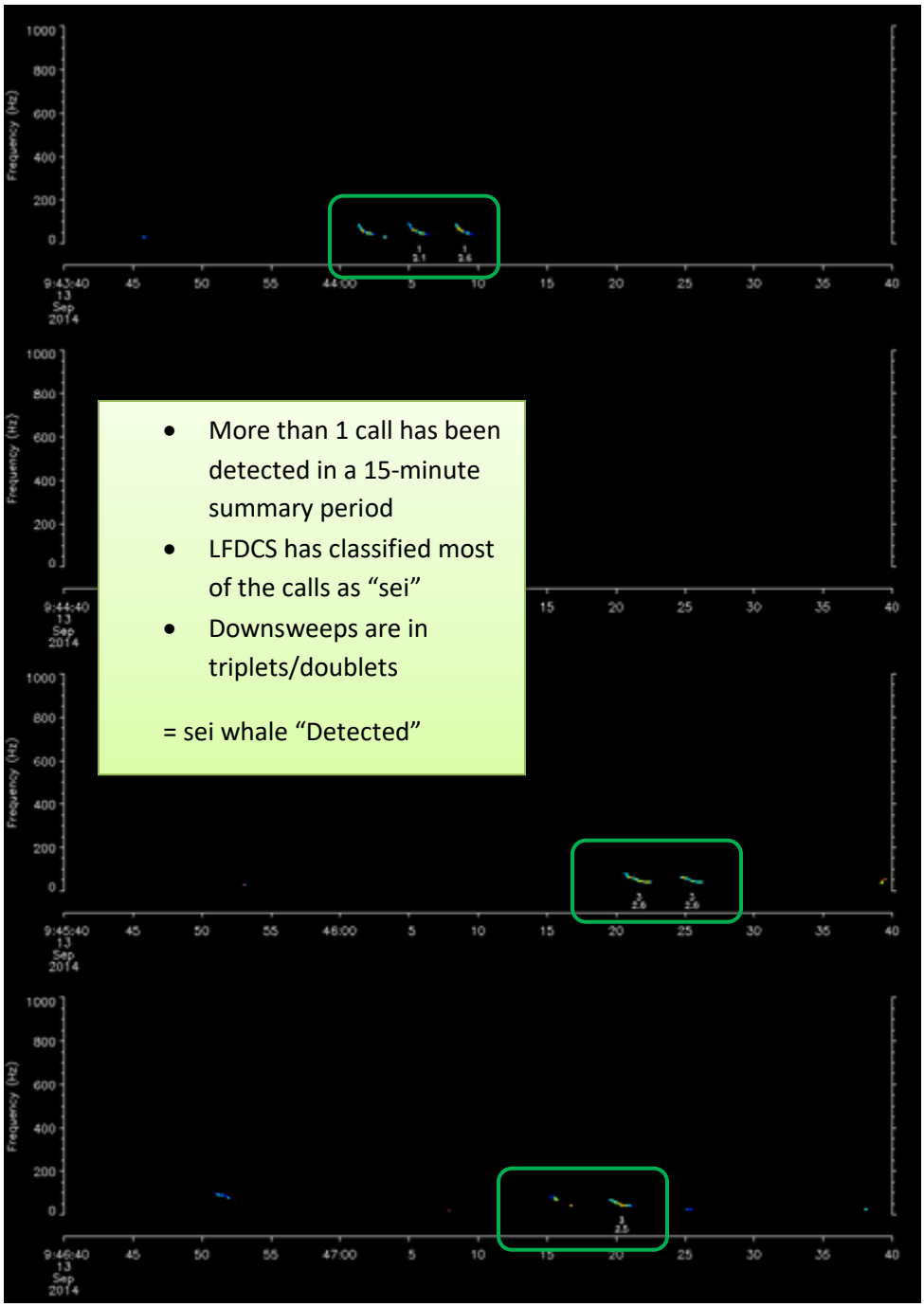
Sei whales emit downsweeps that are produced in singles, doublets, or triplets. For a detailed description of sei whale call characteristics, see Baumgartner et al. 2008. Doublets or triplets are believed to be diagnostic of species presence. Low-frequency downsweeps in singles or singles in uniform succession can also be produced by humpback whales, so care must be exercised in the presence of other humpback whale sounds. However, the presence of clear doublets or triplets that are "off-rhythm" with a humpback whale song can be scored as sei whale downsweeps.

Sei whale downsweeps can have subtle variations in time-frequency characteristics that can be difficult to glean from viewing the pitch tracks. If the DMON/LFDCS classification system has classified the call as a sei whale (call types 1-3), you can be confident that the shape, frequency range, and duration of the call all conform to what is expected for a known sei whale downsweep. This can be helpful, particularly when other low-frequency downsweeps of dubious origin are present. Note that some sei whale downsweeps can be classified as call type 17 (humpback whale low-frequency downsweep). If calls of call type 17 are present (particularly in doublets or triplets) and there is no evidence of humpback presence, you should consider the possibility that sei whales are producing the calls.

Detected

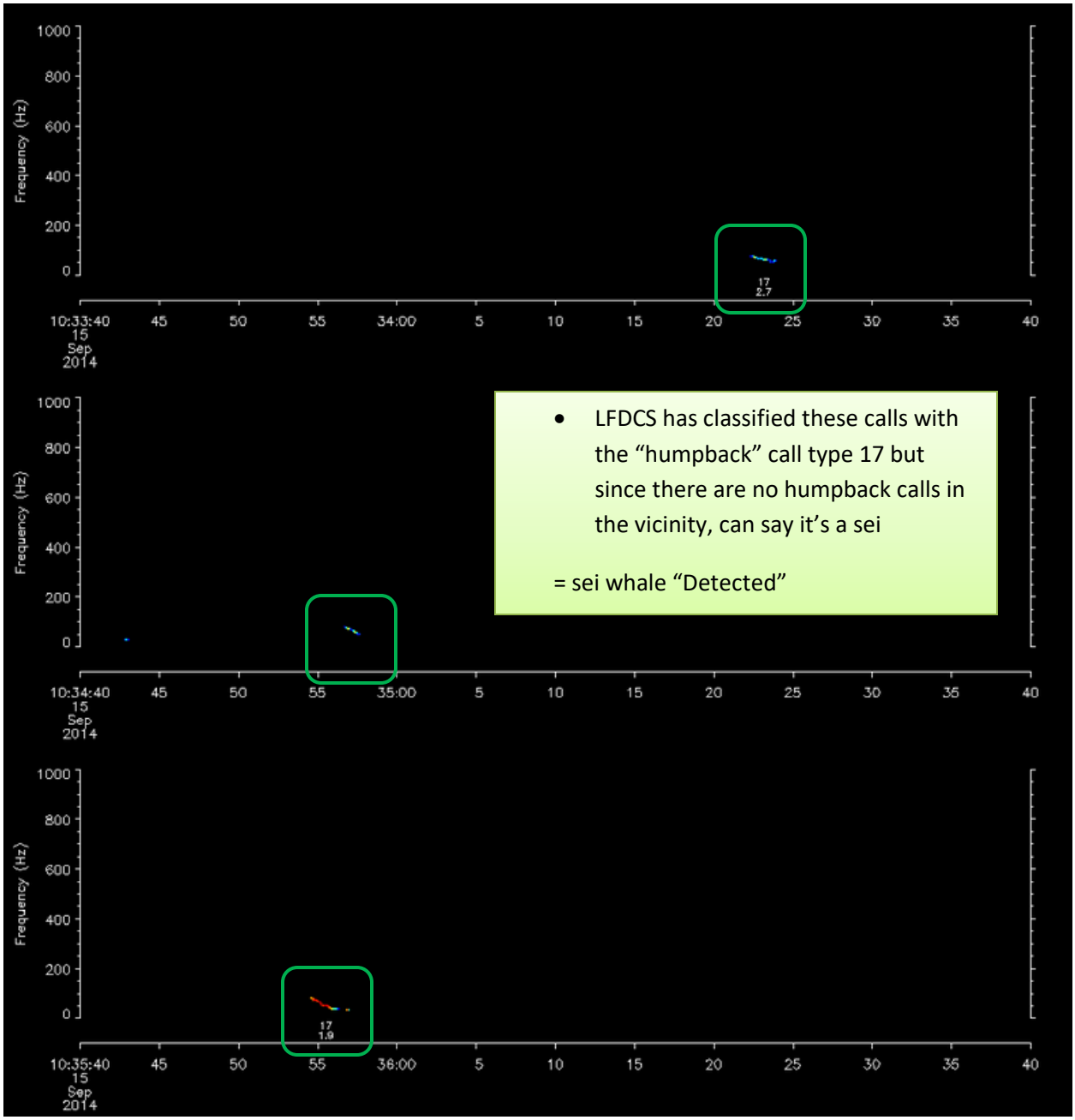
To score a summary period as "Detected" for sei whales, several downsweeps should be present. As few as two downsweeps can be used to justify a "Detected" score if they are present in a doublet and at least one of the calls in the doublet is classified by the DMON/LFDCS as a sei whale call (call types 1-3). If there are many unclassified calls arranged in doublets with no evidence of humpback whale presence, the summary period can be marked as "Detected" (see Roseway Basin example 09/20/14 18:48:42). Doublets or triplets are diagnostic of species presence; be sure that the calls that comprise doublets or triplets are ~3.5 seconds apart (i.e., 3.5 seconds between the start of one call and the start of the next call; see Baumgartner et al. 2008). Exercise caution when only single calls are present; however, 3 or more classified single calls (not in a regular pattern) can be scored as "Detected".

The following images show examples of when a sei whale could be considered “Detected”.



- More than 1 call has been detected in a 15-minute summary period
- LFDCS has classified most of the calls as “sei”
- Downsweeps are in triplets/doublets

= sei whale “Detected”

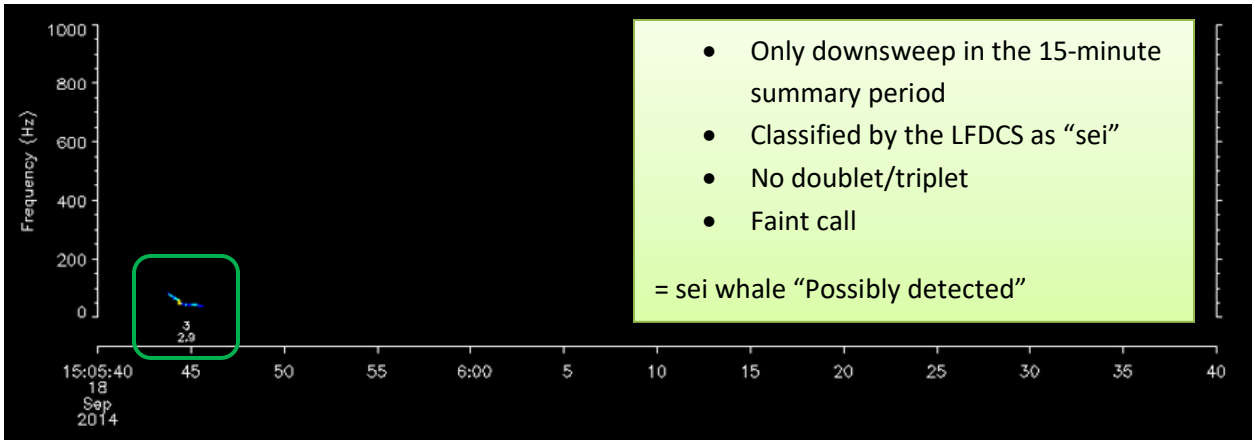


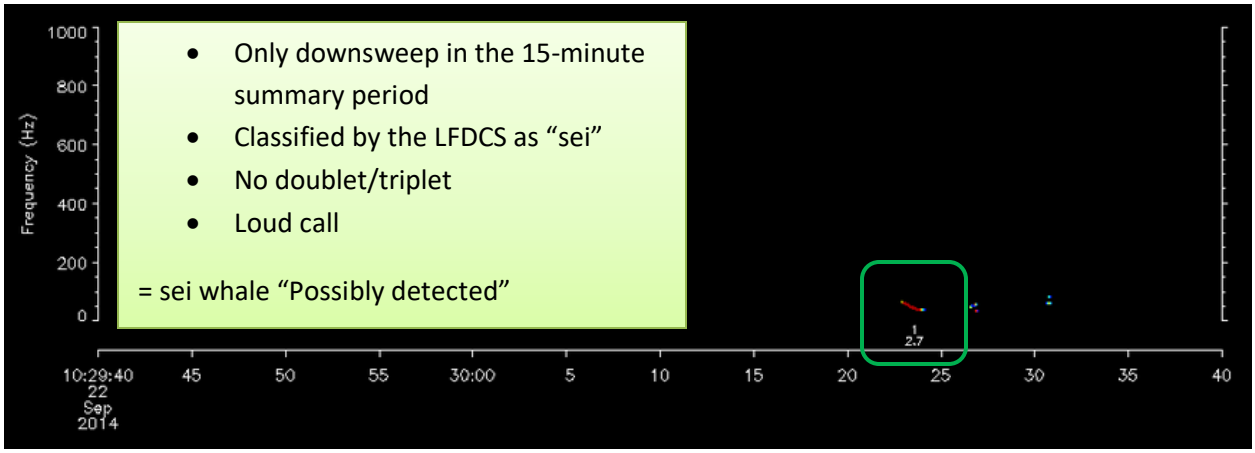
- LFDCS has classified these calls with the “humpback” call type 17 but since there are no humpback calls in the vicinity, can say it’s a sei

= sei whale “Detected”

Possibly detected

If 1-2 single calls within the 15-minute summary period have been classified by the LFDCS as “sei”, then it can be considered “Possibly detected” (other unclassified downsweeps could be present). If only a doublet is present but neither of the calls has been classified as sei whale downsweeps, the summary period can be considered “Possibly detected”. If humpbacks are present, exercise caution (see General above). The following images show examples of “Possibly detected” sei whale calls.





Not detected

If there is only one downsweep present within the 15-minute summary period but it is not classified, then it can be considered “Not detected”. If there are unclassified calls that look like they could be sei whales, but they are not in doublets/triplets, too long in duration, or not in the expected frequency band of 30-100 Hz, then score it as “Not detected”. It may be helpful to comment in the notes why you chose “Not detected” if there are signals present.

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Fin whale

Quick guide

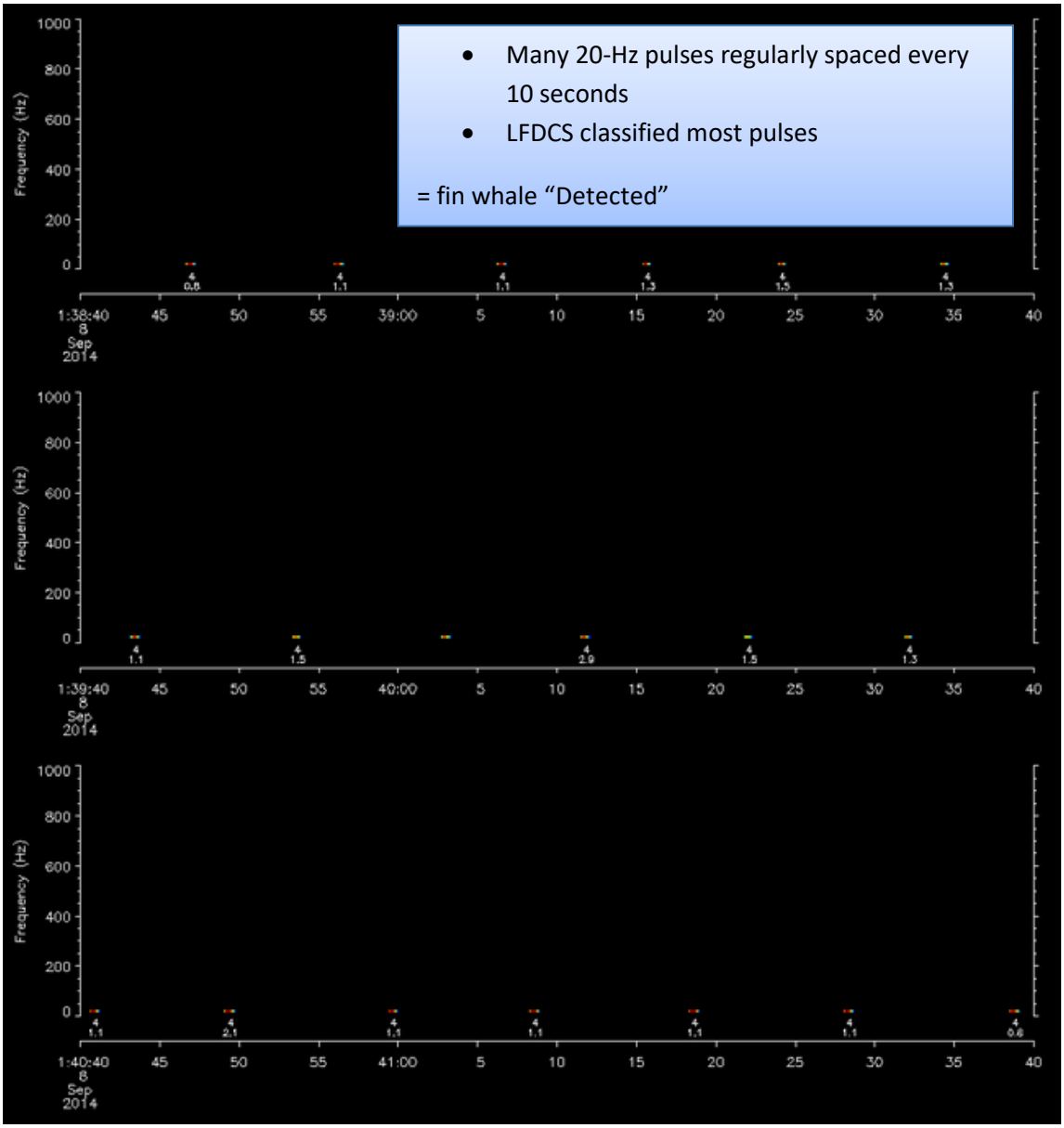
	LFDCS Classified (Y/N)	Pattern	Context	Number of calls needed
Detected	Y	Repeated with constant 7-17 s interval (do not count missing calls as part of pattern)	NA	4+ calls in pattern (2+ must be classified as fin)
Possibly detected	Y	3 calls in pattern with constant 7-17 s interval (do not count missing calls as part of pattern)	NA	3 in pattern (2+ must be classified as fin)
Not detected	N	No pattern or irregular pattern	NA	NA

General

Fin whales emit 20-Hz pulses (downsweeps) that occur in regular patterns (pulse trains). Inter-pulse intervals can be between 7 and 17 seconds. The DMON/LFDCS usually does a good job classifying these calls, so if you see a call that looks like a 20-Hz pulse but is not classified as one, be suspicious; it may be in the wrong frequency band, which is hard to judge at the scale you are typically viewing the pitch tracks. Calls comprising pulse trains should have similar amplitudes.

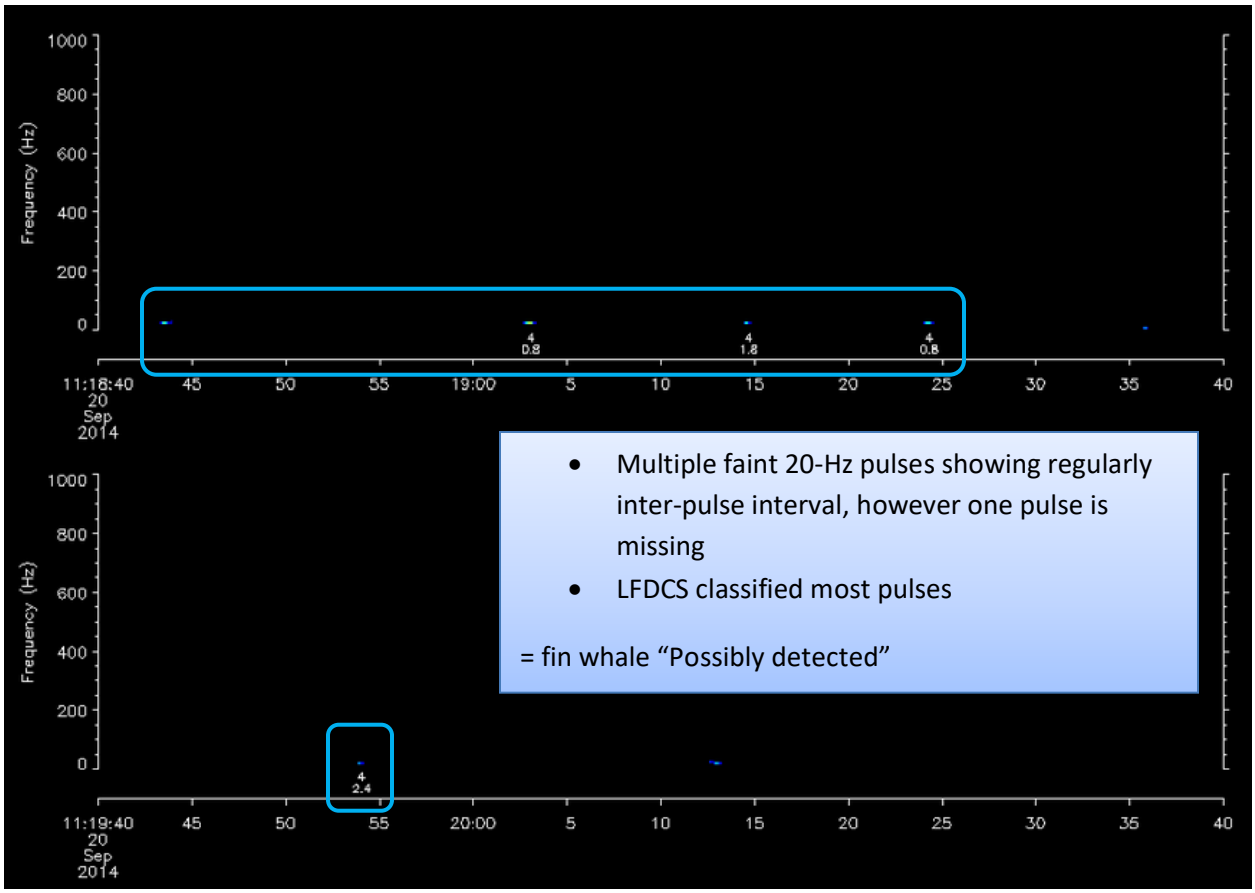
Detected

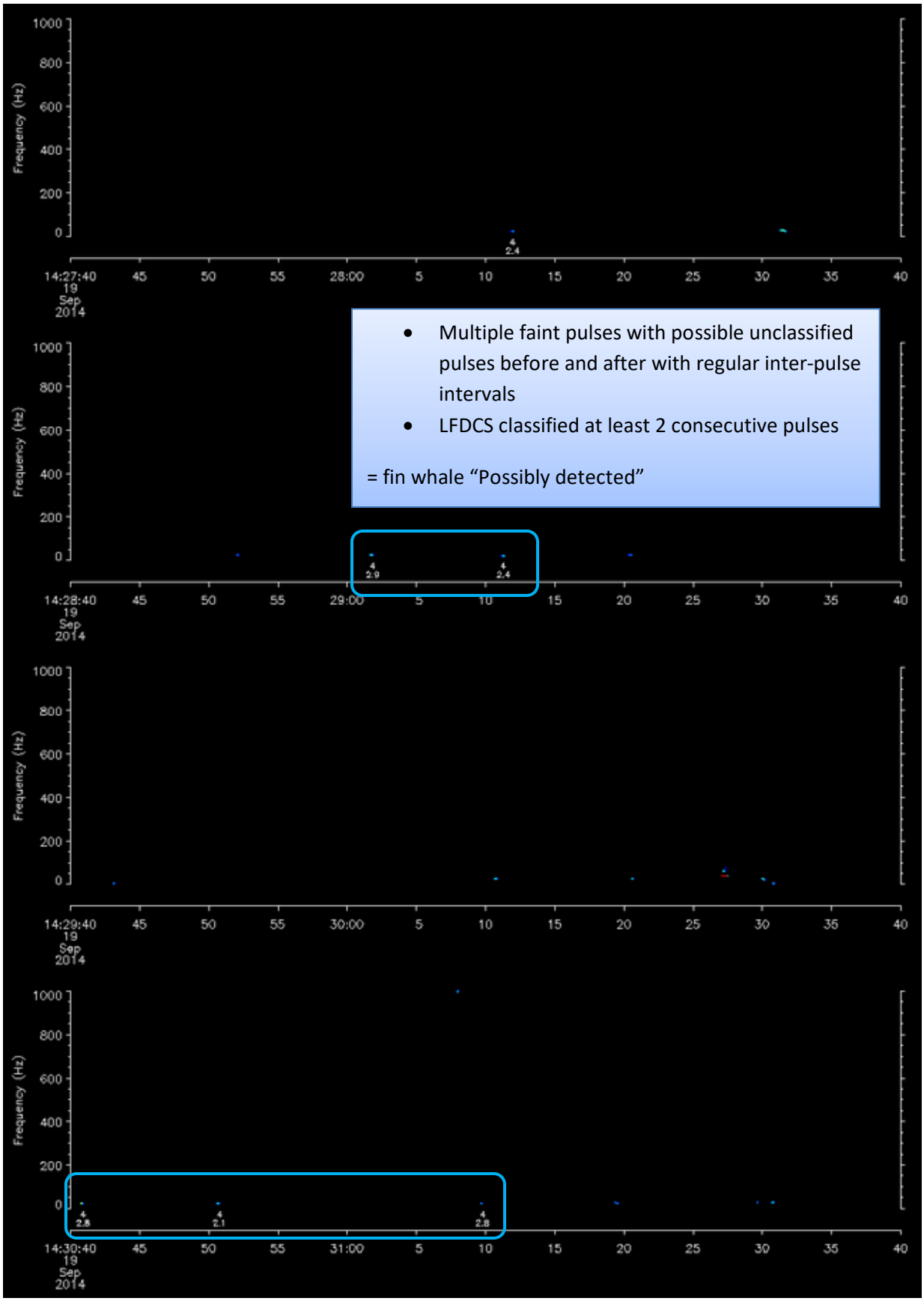
Fin whales can be considered "Detected" if a pulse train comprised of 4 or more 20-Hz pulses (2 or more of which are classified as fin whales) with a constant inter-pulse interval of 7-17 seconds occurs in a 15-minute summary period (e.g., 4 pulses between which the inter-pulse interval is equal to 8 seconds, or 4 pulses between which the inter-pulse interval is equal to 12 seconds). An example of this is shown below.



Possibly detected

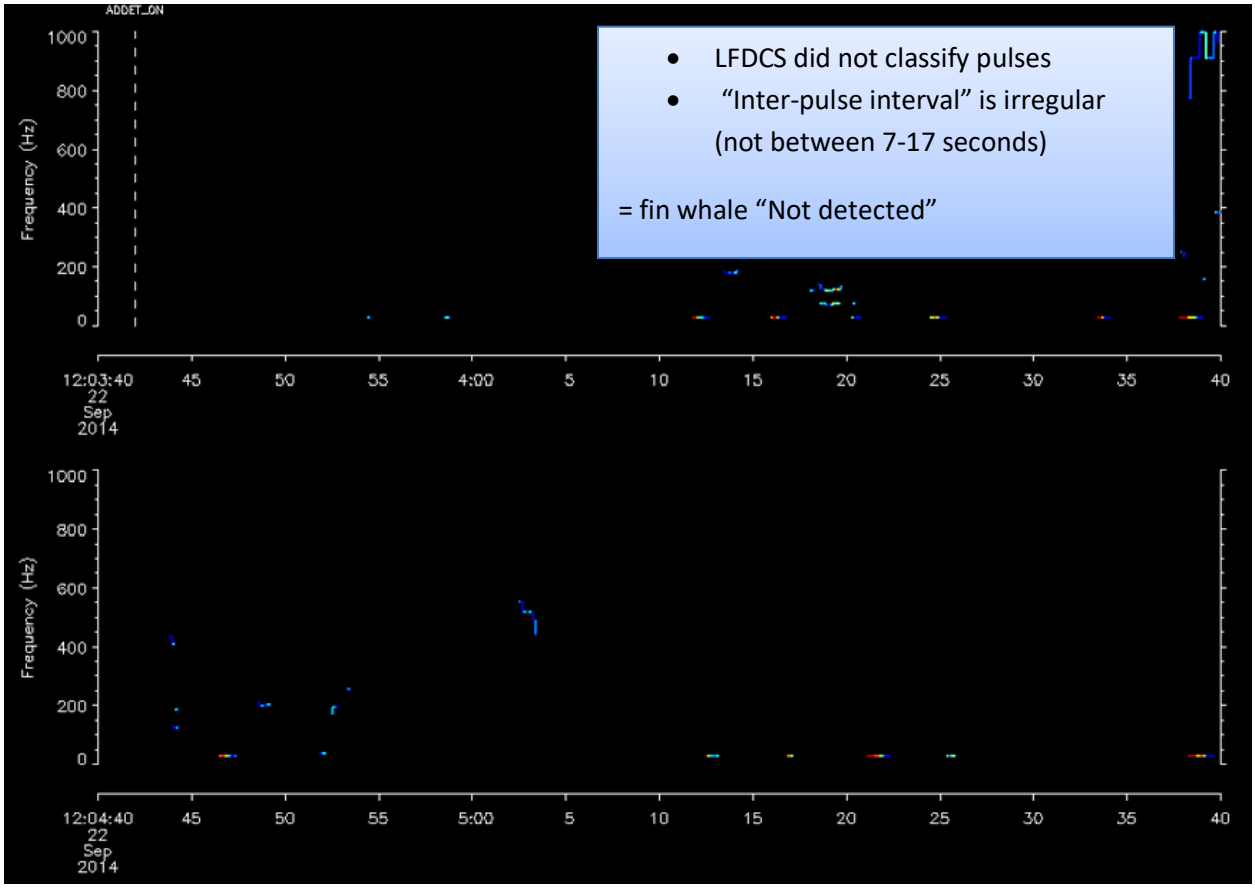
When there are only 3 pulses in a pulse train (2 or more of which have been classified by the DMON/LFDCS as a "fin whale") and that is the only pulse train in the 15-minute summary period, then it should be marked as "Possibly detected". Be careful that pulse trains can be "broken", particularly when the calls are faint (i.e., there is a silent period where a pulse should be based on the inter-pulse interval). Do not count missing pulses (i.e., "phantom" pulses) as part of the pulse train. Exercise caution when there is an abundance of low-frequency noise that is being pitch tracked; some low-frequency sounds may look like fin whale calls, but it is difficult to discriminate frequencies by eye near the bottom of the spectrogram. The following images depict examples of "Possibly detected" fin whale pulses.

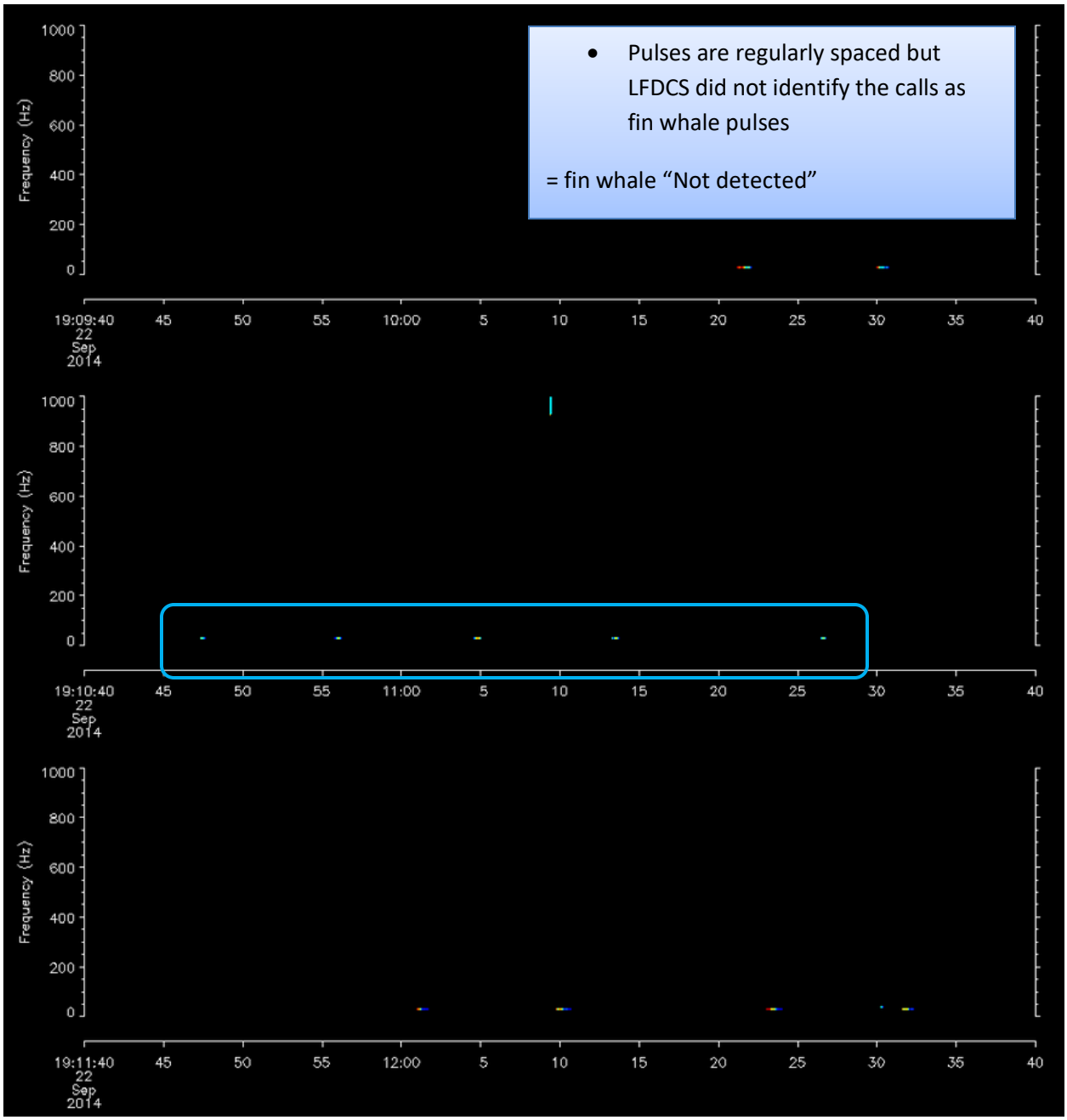



Frequency (Hz)
1000
800
600
400
200
0
14:27:40
19
Sep
2014
45
50
55
28:00
5
10
15
20
25
30
35
40
14:28:40
29:00
14:29:40
30:00
14:30:40
31:00
2.4
2.9
2.1
2.8
• Multiple faint pulses with possible unclassified pulses before and after with regular inter-pulse intervals
• LFDCS classified at least 2 consecutive pulses
= fin whale “Possibly detected”

Not detected

For a pulse train to be considered "Not detected", none of the calls in the pulse train should be classified, the inter-pulse interval varies, or the inter-pulse interval is not within the 7-17 second bounds. The following images depict examples of periods that should be scored as "Not detected" for fin whales.





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Right whale

Quick guide

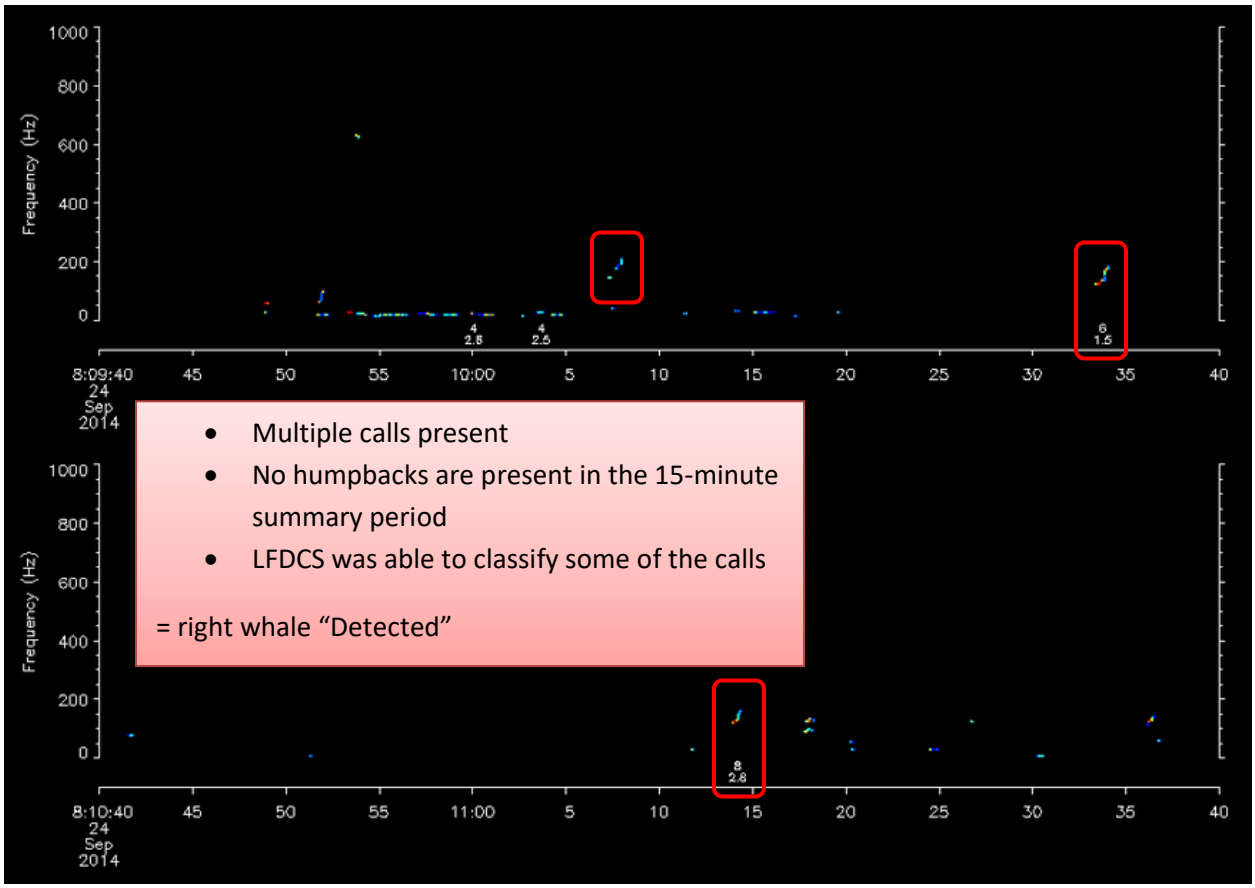
	LFDCS Classified (Y/N)	Pattern	Context	Number of calls needed
Detected	Y	None	If humpbacks present, assess for off-rhythm and/or different amplitude	3+ upcalls, 1+ must be classified
Possibly detected	Y/N	None	If humpbacks present, assess for off-rhythm and/or different amplitude	1-2 classified or 3+ unclassified
Not detected	N	None	N/A	NA

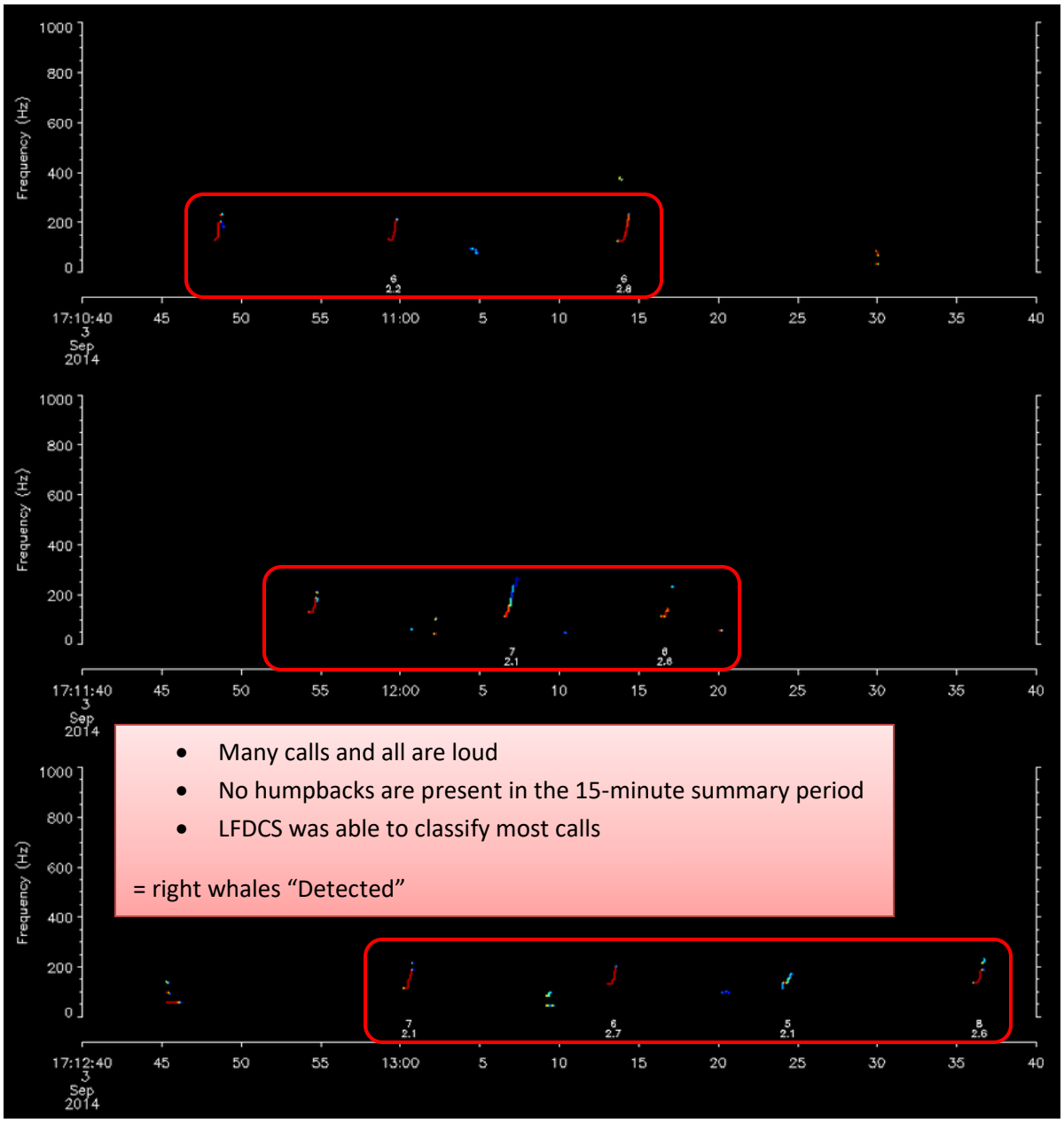
General

Right whales produce an upsweep between 50 and 300 Hz called the upcall. In contrast to fin and humpback whale patterned calling (song), the upcall is not produced often or in any recognizable pattern. The upcall is most often confused with a similar call sometimes produced by humpback whales, so context is particularly important when determining if right whales are present. Any upcalls observed concurrent with humpback-like pitch tracks should be treated with suspicion. Only upcalls that are "off-rhythm" with a humpback song or of different amplitude (e.g., humpback song is loud, upsweep is quiet) might be considered as produced by a right whale. Upcalls in complete isolation (i.e., without any evidence of humpback presence) are much more likely to be produced by right whales.

Detected

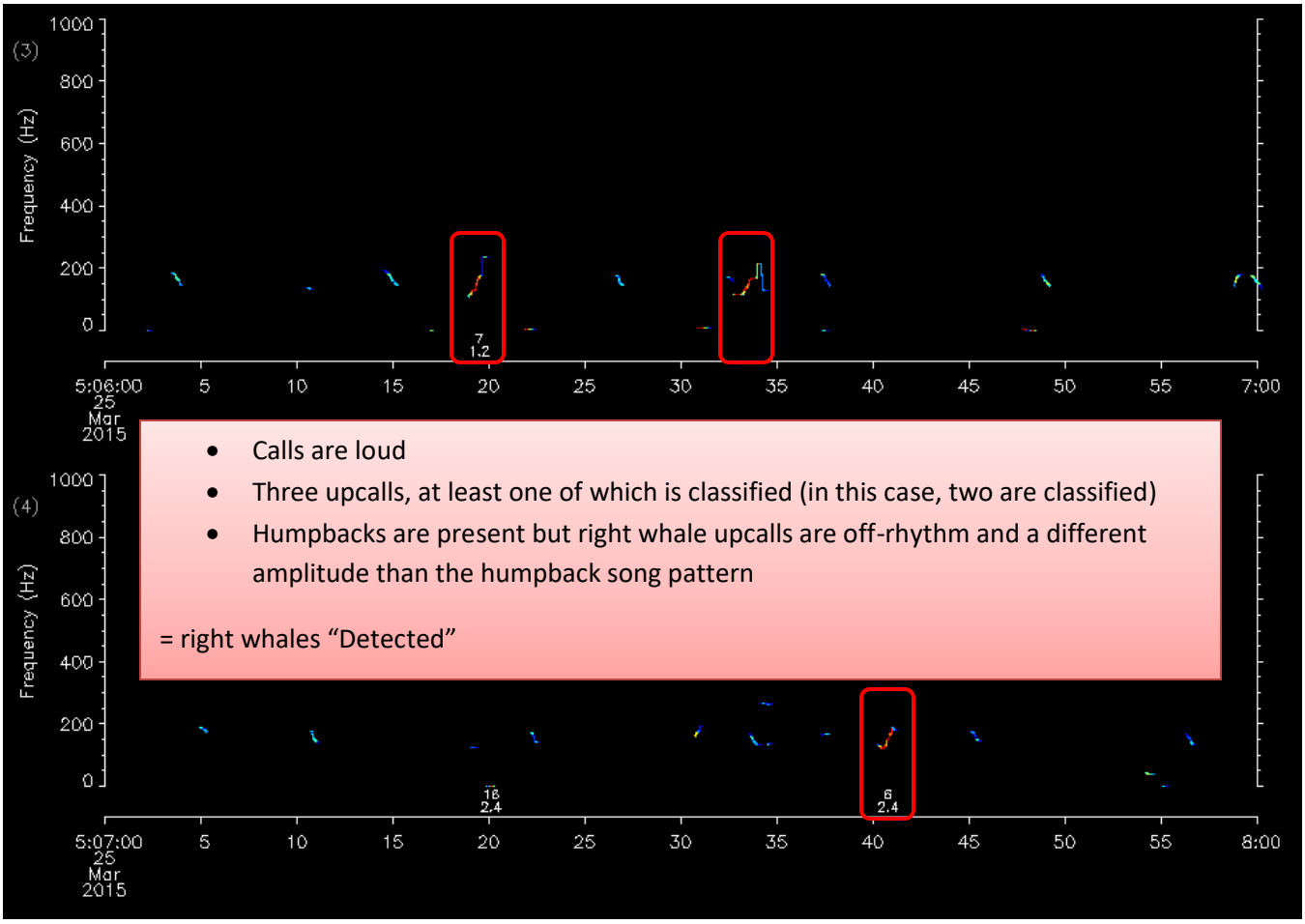
Right whales can be scored as “Detected” when 3 or more upcalls are detected, one or more of which is classified as a right whale upcall by the DMON/LFDCS classification system, and there is no evidence of humpback whale presence. If there is evidence of humpback whale presence, detected upcalls must be off-rhythm or have different amplitude (i.e., loudness) than the humpback whale calls. Occasionally, right whale upcalls may be classified by the DMON/LFDCS as humpback. The following images show examples of “Detected” right whale calls but please refer to the Roseway Basin project if you are unsure.





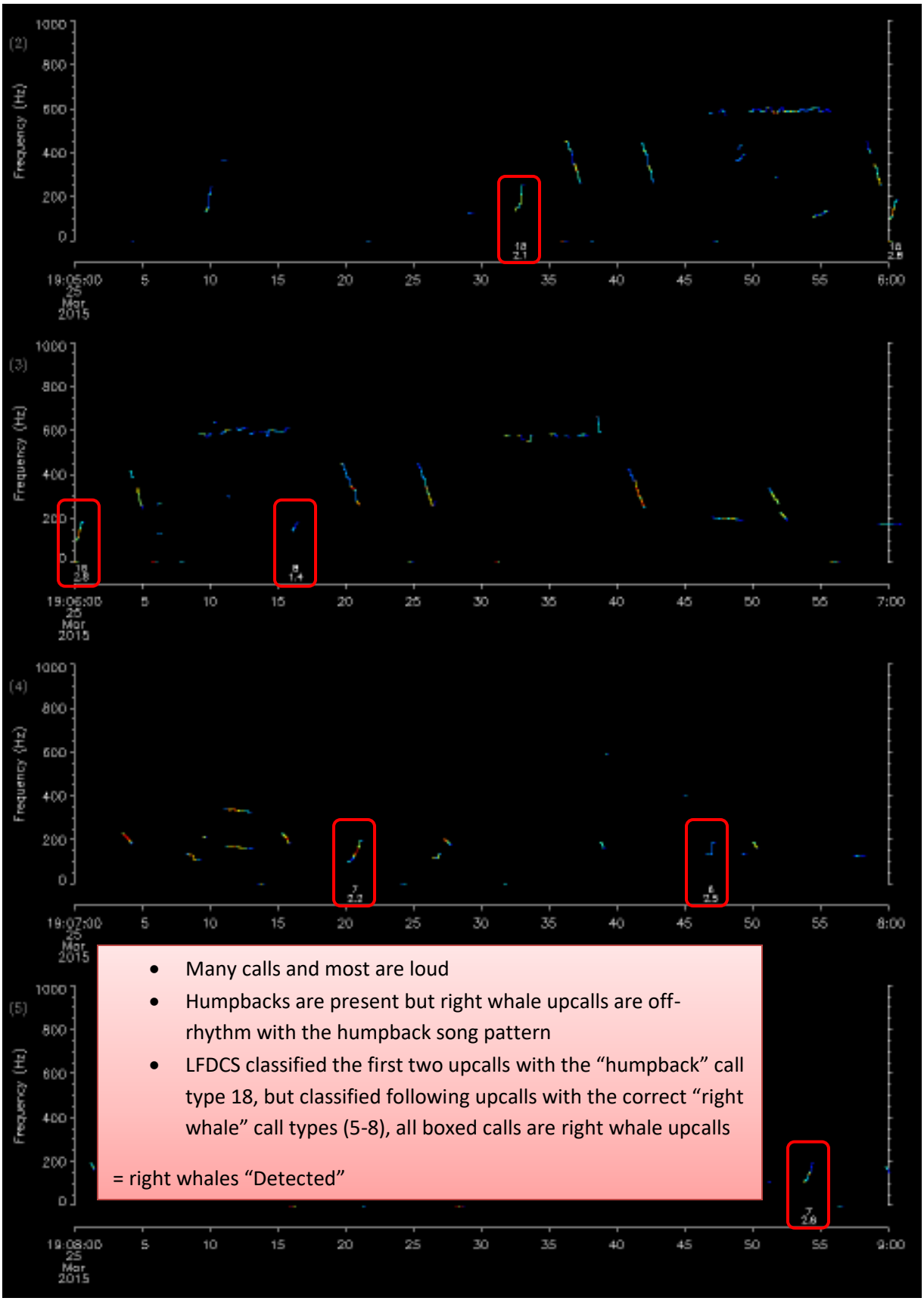
- Many calls and all are loud
- No humpbacks are present in the 15-minute summary period
- LFDCS was able to classify most calls

= right whales “Detected”



- Calls are loud
- Three upcalls, at least one of which is classified (in this case, two are classified)
- Humpbacks are present but right whale upcalls are off-rhythm and a different amplitude than the humpback song pattern

= right whales “Detected”

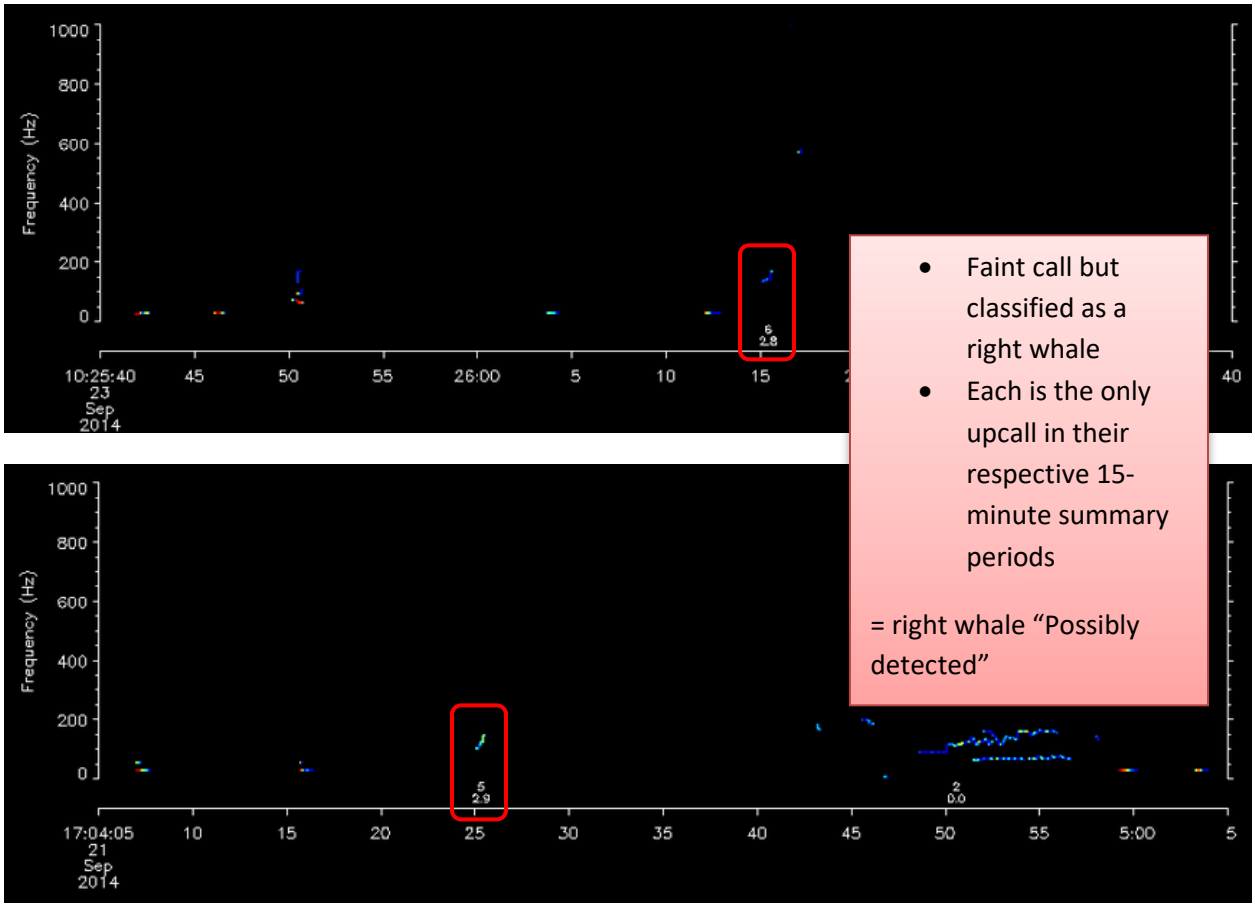


- Many calls and most are loud
- Humpbacks are present but right whale upcalls are off-rhythm with the humpback song pattern
- LFDCS classified the first two upcalls with the “humpback” call type 18, but classified following upcalls with the correct “right whale” call types (5-8), all boxed calls are right whale upcalls

= right whales “Detected”

Possibly detected

If there are only one or two upcalls in a 15-minute summary period, but they are both classified as right whale upcalls, then score “Possibly detected”. If there are 3 or more unclassified calls, score “Possibly detected”. See examples below.

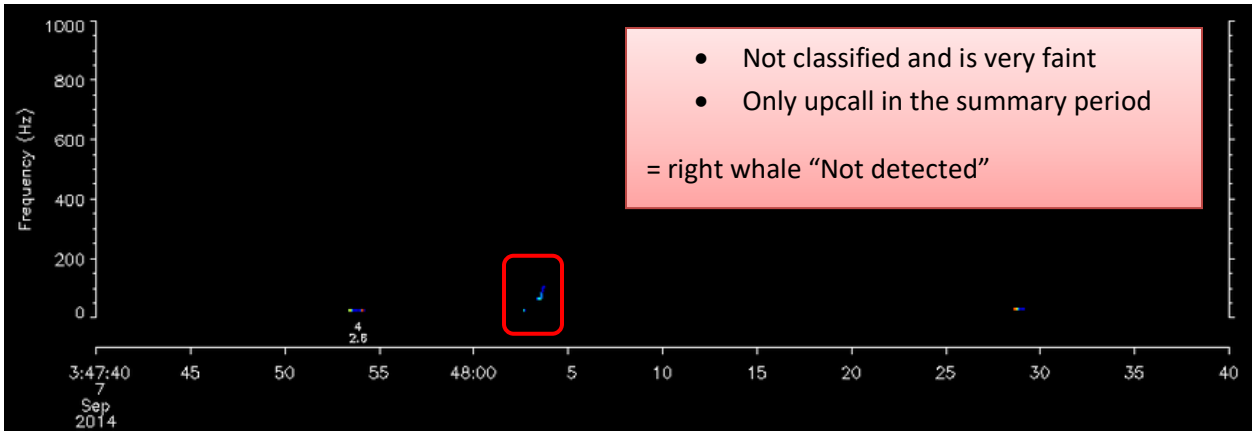


- Faint call but classified as a right whale
- Each is the only upcall in their respective 15-minute summary periods

= right whale “Possibly detected”

Not detected

If there are only 1-2 unclassified upcalls, mark the summary period as “Not detected”. If there are singing humpbacks be cautious! It is helpful to comment in the Notes section of the web form about your suspicions about possible right whale calls.



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Humpback whale

General

Humpback whale song is produced in identifiable patterns (unlike humpback social sounds, which have less patterned structure). Individual calls comprising these patterns can have frequencies ranging from 10s to 1000s of Hz. These patterns are unambiguous in the pitch tracks when they are present and loud. The vast majority of humpback presence will be determined based on the presence of patterned song units, not from DMON/LFDCS classifications. Most humpback whale call types are not represented in the DMON/LFDCS call library, and those that are represented are many years old and may not be applicable to the sounds that humpbacks make today because humpbacks change their song from year to year, and their social sounds are not consistent over time or between populations. Therefore, DMON/LFDCS classification information for humpback whales should not be heavily relied upon (if at all).

Off the U.S. and Canadian eastern seaboards, we often believe that many unknown sounds are produced by humpback whales. While there are little data to back up this belief, it is based upon the idea that humpback whales produce such a high variety of different sounds; so, when an unknown loud tonal sound is encountered, it is assumed to be just another call in the vast humpback whale call repertoire. As such, you may encounter unknown, well-pitch-tracked, loud frequency-modulated sounds in isolation (not accompanied by other sounds) that may or may not be produced with irregular intervals. These calls should be scored as "Detected" if you have other corroborating evidence of humpback presence (e.g., humpback singing in the previous 15-minute summary period), "Possibly detected" if you have other evidence, but there is still some doubt, or "Not detected" if you have no additional evidence for species attribution. Whatever you score, be sure to explain your reasoning in the Notes section for these types of calls. To emphasize again, our overriding principal is being conservative, so only mark a summary period as "Detected" if you are very sure of that species' presence.

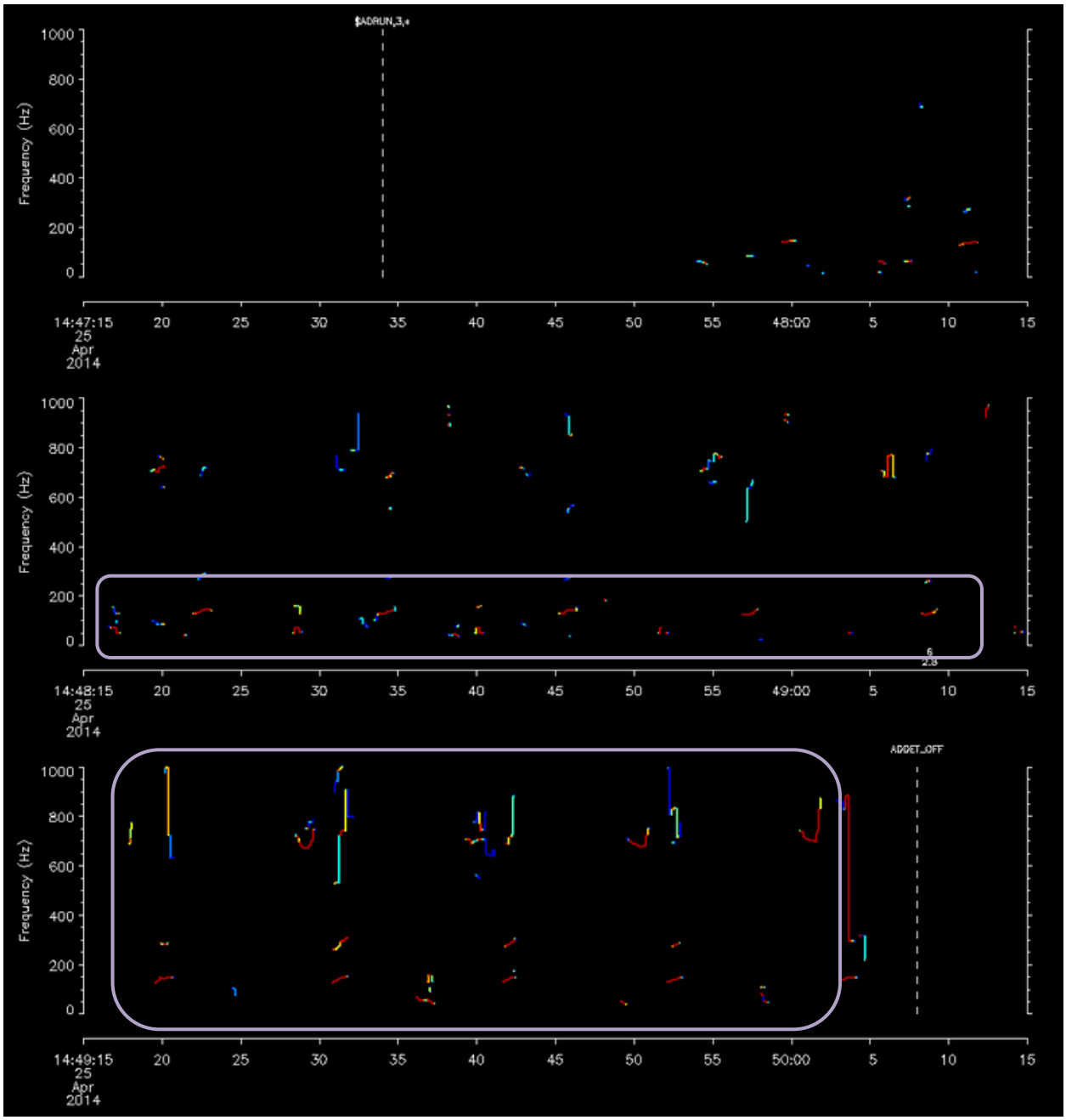
Noise in the upper half of the monitored frequency range can create spurious quiet pitch tracks that sometimes resemble faint humpback calling. Pitch tracks that are in the 500-1000 Hz band, are faint, and change frequency very quickly (making them look almost disjointed) should be viewed with some suspicion.

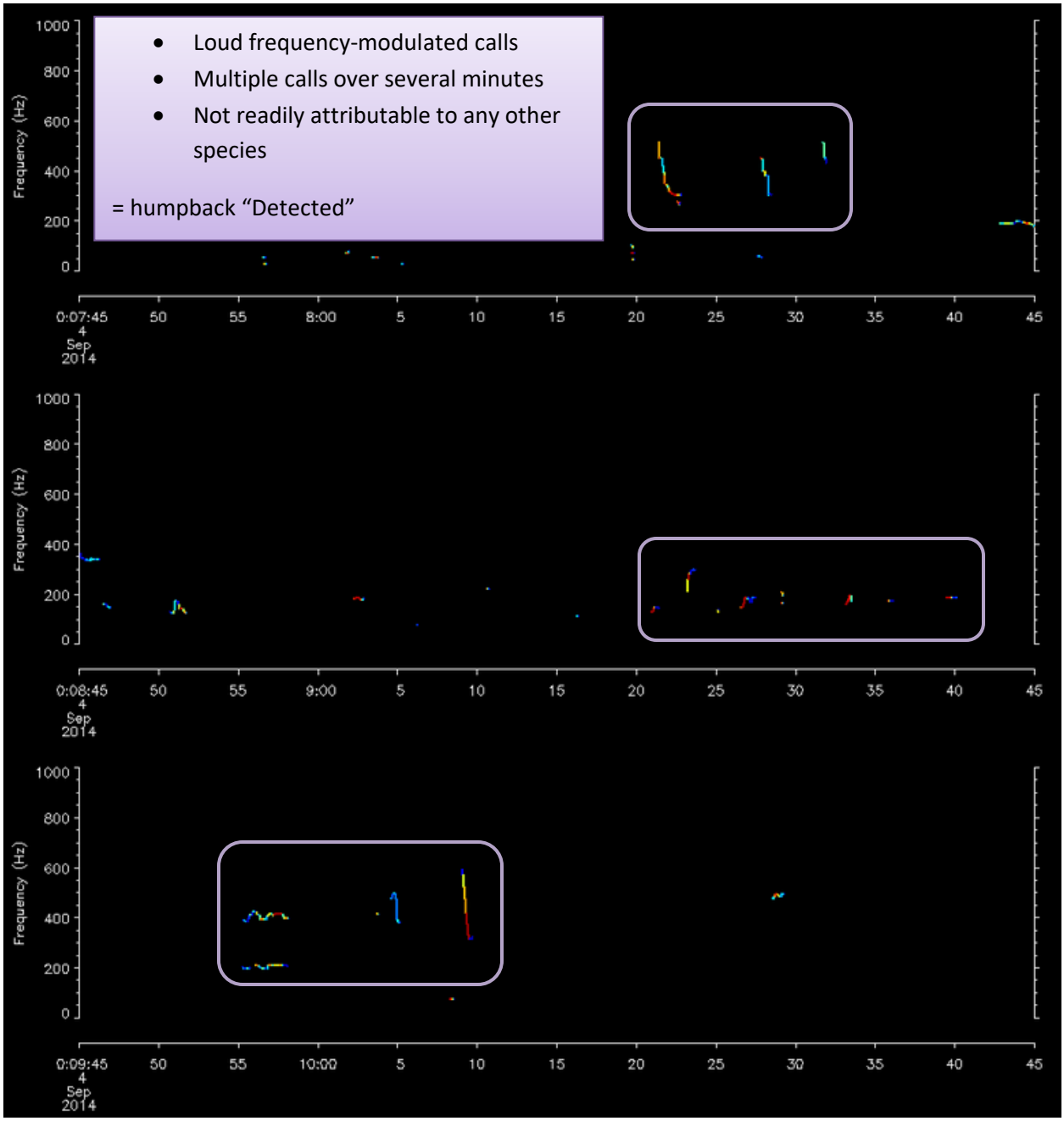
Quick guide

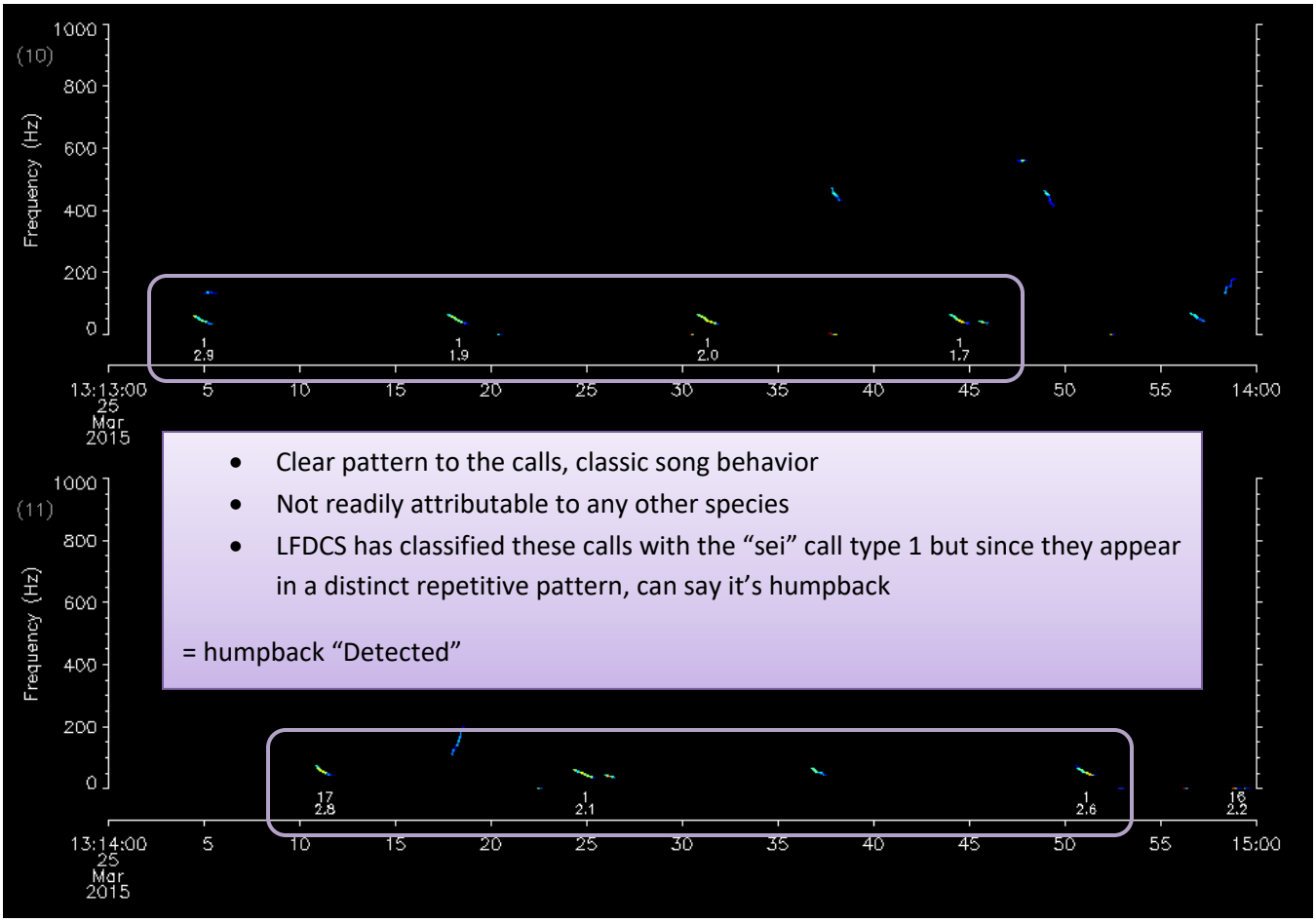
	LFDCS Classified (Y/N)	Pattern	Context	Number of calls needed
Detected	Y/N	Often many calls grouped together that are repeated	None	Many (5+)
Possibly detected	Y/N	Some calls in repetition or no pattern	None	Few (1-4)
Not detected	N	None	None	NA

Detected

If you see patterned calling (e.g., song), then mark the summary period as “Detected” for humpback whales. If patterned calling is not present, look for frequency-modulated calls of moderate to high amplitude (loudness) that are not attributable to any other species. Calls will not necessarily have a DMON/LFDCS classification as the system does not recognize all the types of calls a humpback can make. Most of the time, in the tally table, humpback calls will be classified as “Other” because of this reason. Occasionally, humpback calls may be classified as other species (e.g., sei or right whales). These situations are depicted in the following examples.

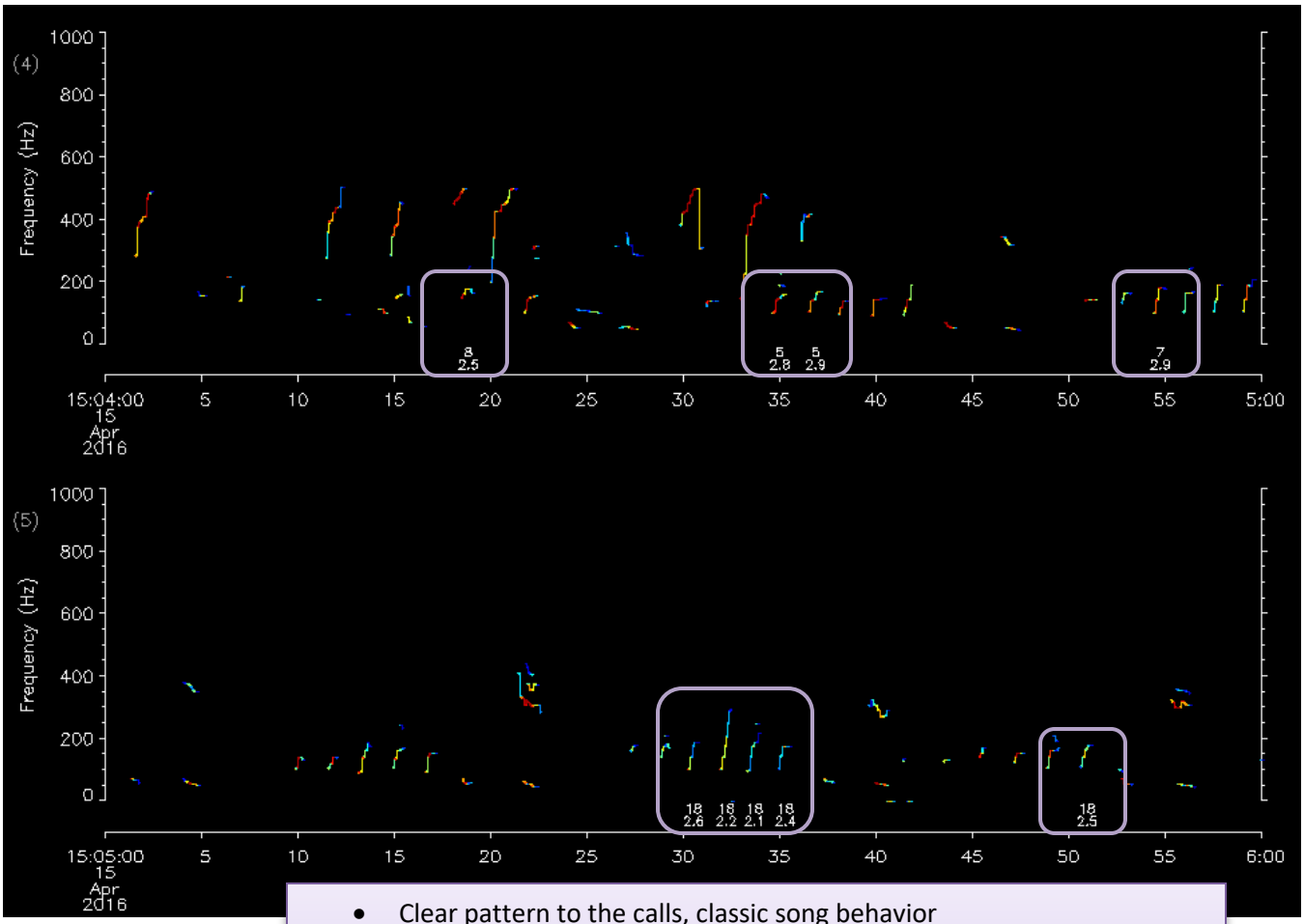



Loud frequency-modulated calls
Multiple calls over several minutes
Not readily attributable to any other species
= humpback “Detected”
Frequency (Hz)
1000
800
600
400
200
0
0:07:45
0:08:45
0:09:45
4
Sep
2014
50
55
8:00
9:00
10:00
5
10
15
20
25
30
35
40
45



- Clear pattern to the calls, classic song behavior
- Not readily attributable to any other species
- LFDCS has classified these calls with the “sei” call type 1 but since they appear in a distinct repetitive pattern, can say it’s humpback

= humpback “Detected”

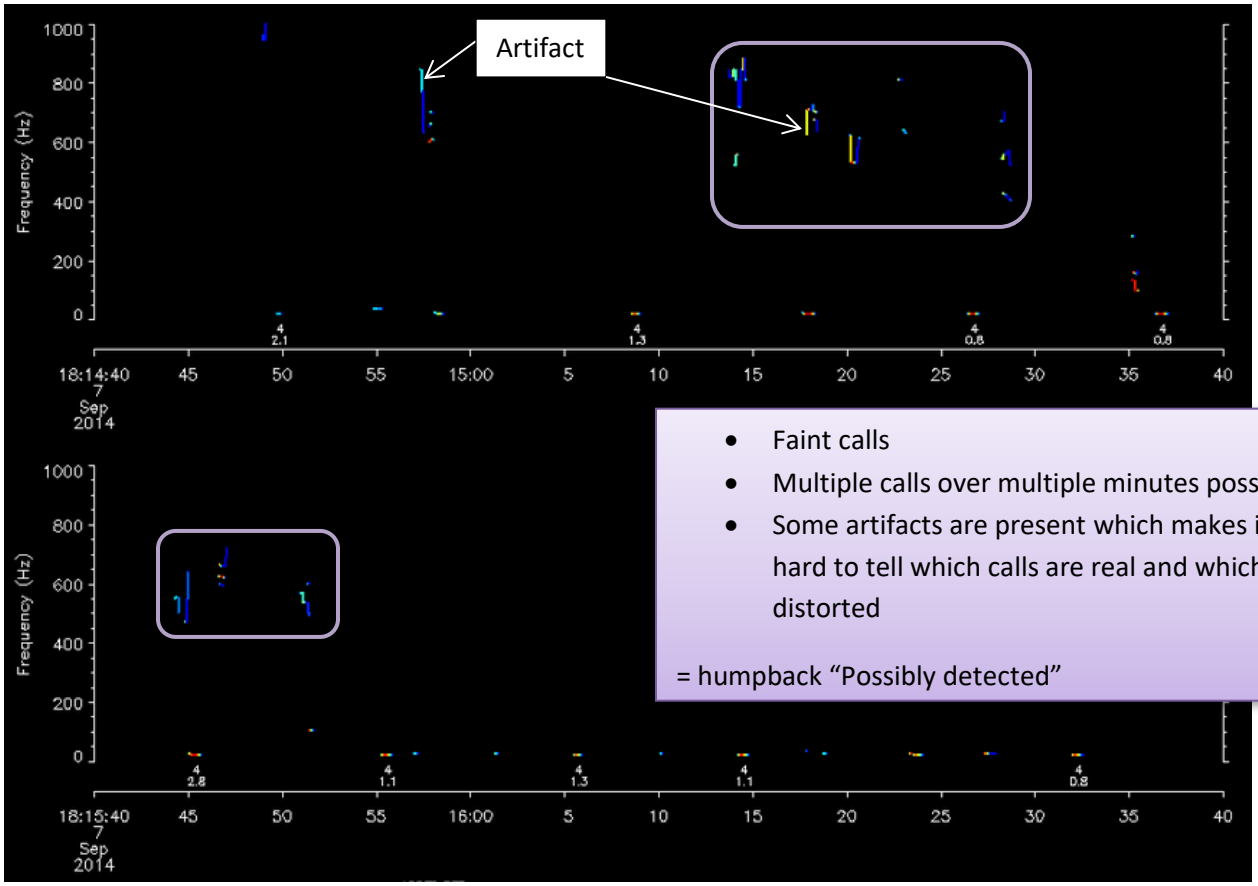


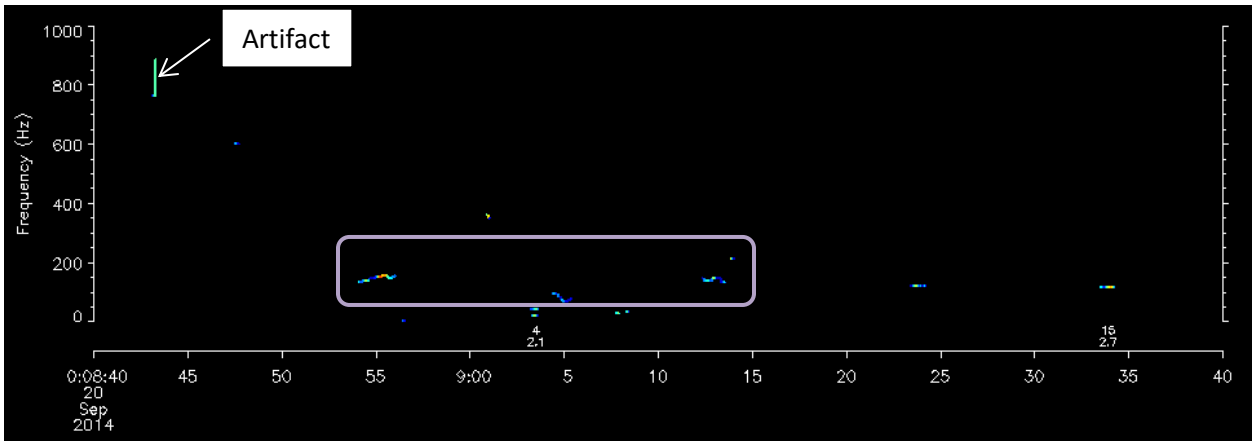
- Clear pattern to the calls, classic song behavior
- Not readily attributable to any other species
- LFDCS has classified the calls in the first minute of data (above) with "right whale" call types (5-8) but since they appear in a distinct repetitive pattern and there are more upsweeps in the second minute (below) with the "humpback" call type 18, can say it's humpback

= humpback "Detected"

Possibly detected

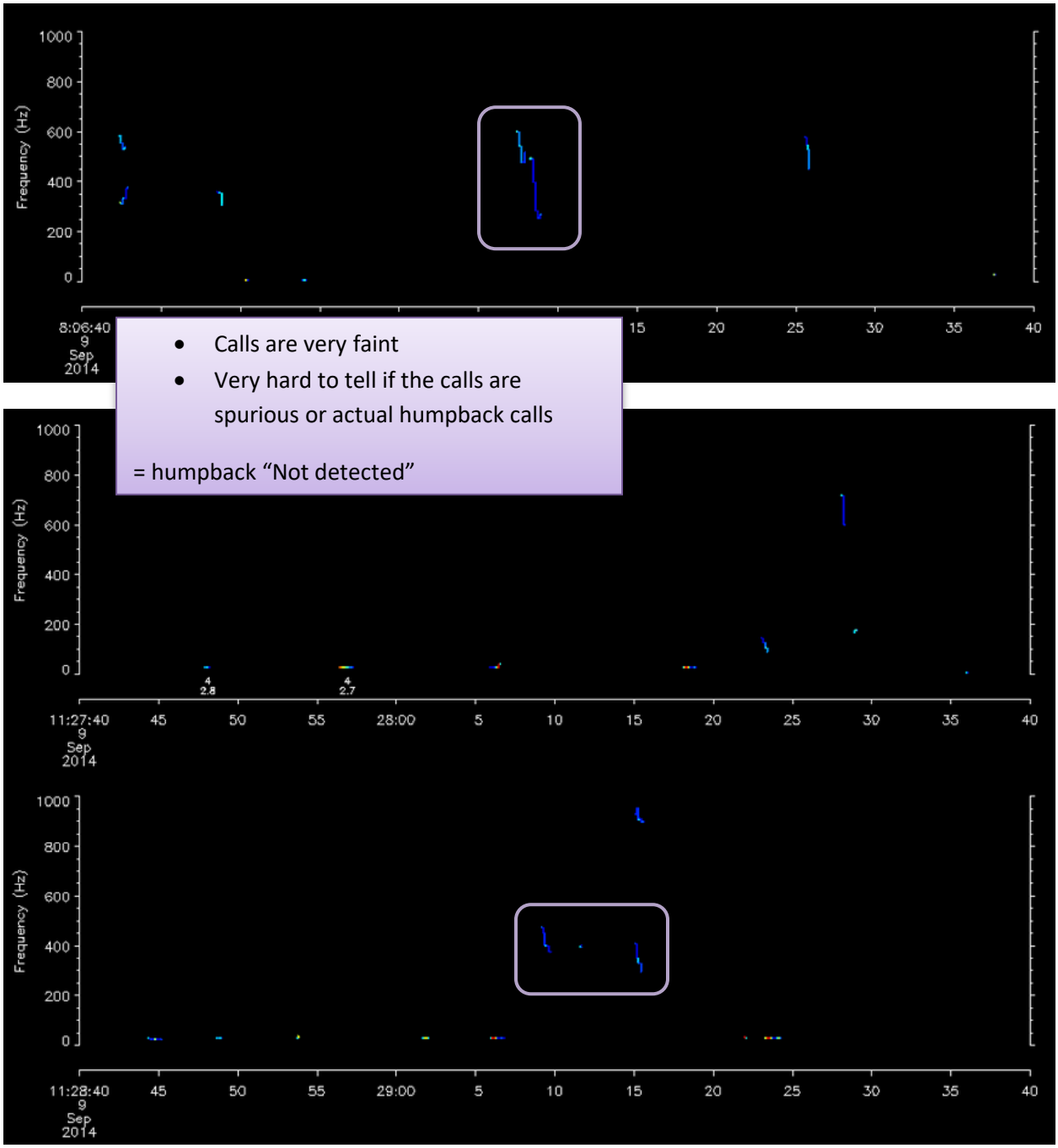
Signals that are faint should be marked as "Possibly detected". Some signals may also have connecting artifacts which can increase the difficulty when determining whether a pitch track is depicting a real call or just noise. This explained in more detail in The Four Main Criteria: Shape section of this document. Examples of artifacts and faint humpback calls are shown in the figures below.





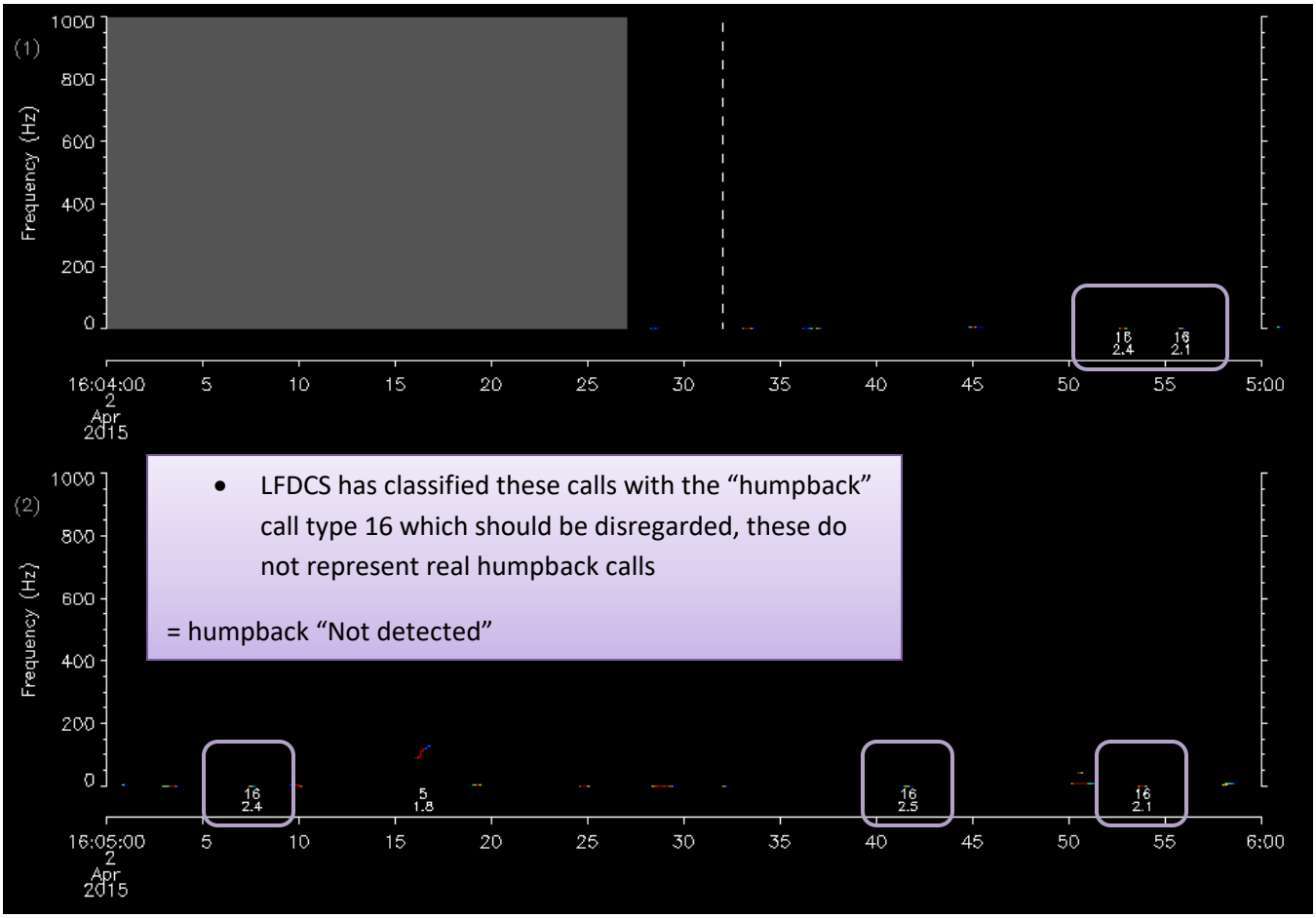
Not detected

When there are only a few faint calls, mark the 15-minute summary period as “Not detected”. There may also be some low frequency tonal pitch tracks that have been classified with the humpback call type 16 and should be disregarded during the analysis since this call type is usually not indicative of a real call. The following images show examples of both these situations.



- Calls are very faint
- Very hard to tell if the calls are spurious or actual humpback calls

= humpback “Not detected”



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Known Idiosyncrasies

Artifacts of the pitch tracking algorithm

This has been explained in The Four Main Criteria: Shape section, with examples in the Humpback whale: Possibly detected section. It is important to note that not just humpbacks are susceptible to artifacts, but also right whale upcalls.

Call types 1 and 17

The DMON/LFDCS classification system may occasionally classify sei whale downsweeps with the humpback call type 17. An example of this can be seen in second image in the Sei whale: Detected section. Conversely, the system may also classify humpback downsweeps with the sei whale call type 1. An example of this can be seen in the third image in the Humpback whale: Detected section. These should be reviewed on a case-by-case basis as to whether they fit into the song of a humpback, or if they resemble the downsweeps of a sei whale (e.g., in the form of singlet, doublet, or triplet downsweeps).

Call type 16

The DMON/LFDCS classification system may classify spurious pitch tracks of low frequency noise with the humpback call type 16. These classifications should be disregarded when analyzing pitch tracks for species presence. This situation can be seen in the second example in the Humpback whale: Not detected section.

Call types 5-8 and 18

The DMON/LFDCS classification system may classify right whale upcalls with the humpback call type 18. An example of this can be seen in the fourth image in the Right whale: Detected section. Conversely, the system may also classify humpback upsweeps as right whale (call types 5-8). An example of this can be seen in the fourth image in the Humpback whale: Detected section.

Webpage updates

If there is a “Daily analyst review” table in your project, it is important to note that after you have reviewed a pitch track (or multiple pitch tracks), it will take between 5-10 minutes for your classifications to be shown on that table. This is also generally true for filling out forms; if you go back to review a recently modified form, you may see that the form has not been filled out. That is not true, but rather that the web browser has not automatically refreshed the page. Simply click the “Reload” or “Refresh” button on your browser and the data that you entered into the form will be visible.

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