

The Audio Studio at the DMC is an ideal place to record voiceover narrations or interviews. The studio is equipped with an iMac running Audacity, an Audient iD44 interface, and four Shure SM58 microphones labeled as **MIC1– MIC4** respectively.



Please open Audacity from the dock and follow the instruction below to record your audio.

- **Using Audient interface control:**

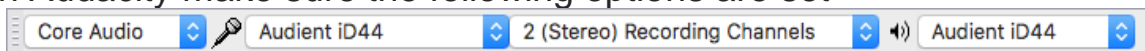
- The Audient iD44 has four input channels, each connected to one of the mics. You will likely not need to change any of the input devices, so leave them set up as is.
- The Audient iD44 has 2 outputs for headphones natively, but instead has been set up to output through the Presonus headphone splitter, which connects to the four sets of headphones labeled **HP1 – HP4**. Each of these headphones corresponds to the same numbered mic, and can be used to monitor that mic as you are recording. You can listen to playback of your recording through any of the sets of headphones. There are individual dials for adjusting volume for each set of headphones on the Presonus device.

- **Adjust input level:**

- Speak to the mic at the level you are wishing to record at;
- Listen using the corresponding headphones, adjust the mic level up by turning the gain knob corresponding to the mic you are using clockwise, adjust it down by turning it counterclockwise. With our mics, you will need it turned up nearly all the way or all the way.

- **Check Audacity settings**

- In Audacity make sure the following options are set



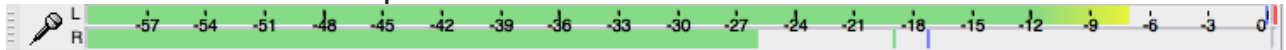
- **Output –**
- Choose “Built-In Output” for the built-in iMac speakers, or
- Choose “Audient iD44” if you wish to use headphones
- Choose “**Audient iD44**” as audio input.
- **Channels -**
- Choose “**2 (Stereo) Recording Channels**” when using **both mics** (MIC1 for left channel, MIC2 for right channel). Use this setting to record interviews or conversations.
- Choose “**Mono recording channel**” when recording solo.

Use **MIC1** because this will be the input mic when "Mono recording channel" is selected.

- Note 1: if your recording is in Mono mode(i.e. left channel or right channel), your exported wave or mp3 file will be in mono mode too unless you follow the instructions at the end of the guide to convert it to a stereo track.
- Note 2: Even if you choose "2(Stereo) Recording Channels" when there is only one person talking, only one track has input, the other track (i.e. the right track) will be flat indicating no input signal. As such, use Mono when only one mic is being used.
- Note 3: Because we have four mic inputs, you can record up to four simultaneous mono channels by selecting "4" in the recording channels tab.

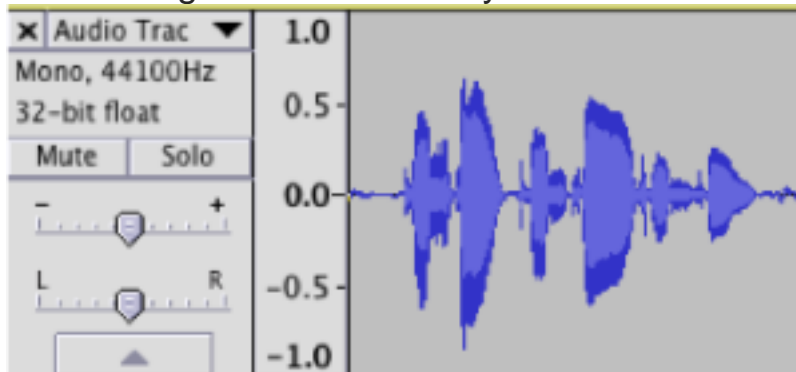
- **Monitor recording level in Audacity:**

- Click the Microphone icon to monitor your input level. Talk into the microphones again at the level and distance from them that you will be recording at.
- You should try and keep your levels around -12 for best results. If your levels are too high or low in Audacity, refer to step 2 to fine-tune the microphone levels on the Audient interface



- **Start to record with Audacity**

- To start recording, press the "R" key on the keyboard or the red circle up near the top left corner. You should see sound waves forming on the tracks as you talk.

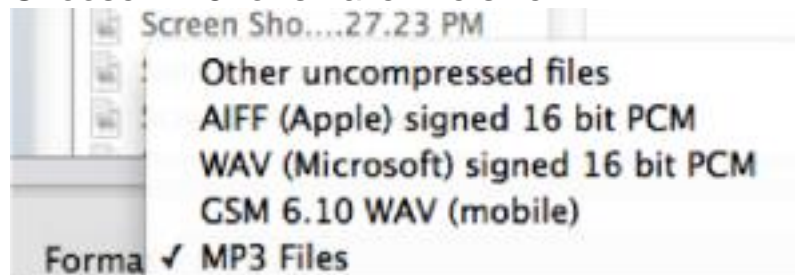


- To stop recording, press the space bar or click the square stop button on the top.

- To resume recording at the end of your existing track, hold down “shift” and press “r” or “shift” and click the red record circle to resume recording. If you do not hold down shift it will begin recording on a new track.
- To playback your recording, press the “spacebar” or click the play arrow up near the top left corner.
- To delete a recording, click and highlight the area you wish to delete, or double-click to select the whole recording. Press the “delete” key on the keyboard.

- **Export your recording**

- Go to File>Export Audio
- Choose a name to save it as and a destination
- Format:
- Choose **WAV 16 bit** or **AIFF 16 bit** for audio CD quality or archival purpose.
- Choose **MP3** for smaller file size.



- Click “Save”

## How to convert a mono track to a stereo track?

**Scenario I: One Voice Recording (voiceover narration, podcast, etc.):** *Note: While a mono audio channel can be played back through a pair of headphones or speakers, this doesn't make it stereo, as the same audio signal is being fed to both speakers simultaneously. For more information on mono and stereo, visit what is joint stereo <http://www.richardfarrar.com/what-is-joint-stereo/>.*

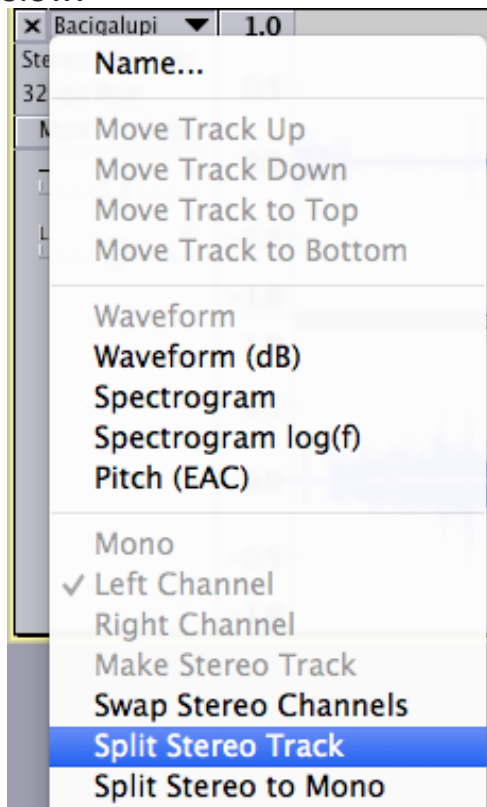
- If your recording is in Mono mode(i.e. left channel or right channel) with just one voice, your exported wave or mp3 file will be in mono mode too unless you convert it to a stereo track.
- To create a stereo pair, go to tracks > add new > stereo track.
- With the selection tool , click anywhere in the original mono track

and press ctrl+A (cmd+a) to select all, then ctrl+c (cmd+c) to copy.

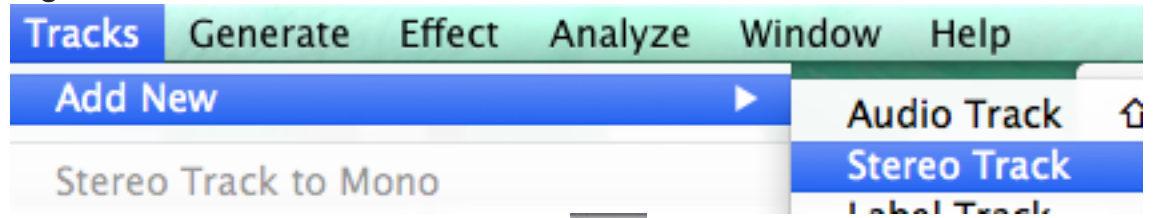
- Now click in the newly created stereo track and press home to position the cursor at the beginning, now ctrl+v (cmd+a) will paste the mono track into the stereo track and automatically give you a left and right channel.
- If you have unintentionally made a mono recording within a stereo track, you can split the left and right channels and delete the silent track. Open the drop down menu next to the track title and choose split stereo track. The channels are now separated, then click on **X** on the upper left corner to delete the silent track.
- Now you can go to top menu, File>Export Audio...


### Scenario II: Two Voice Recording (conversation, interview, etc.)

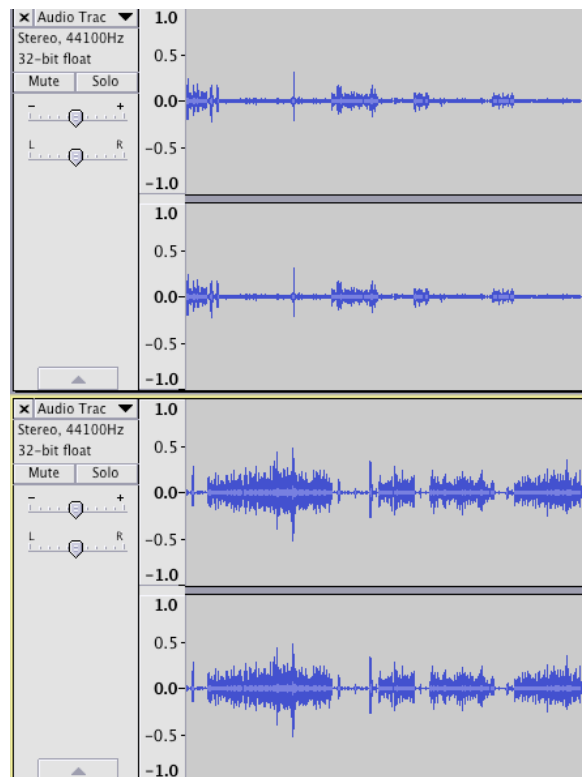
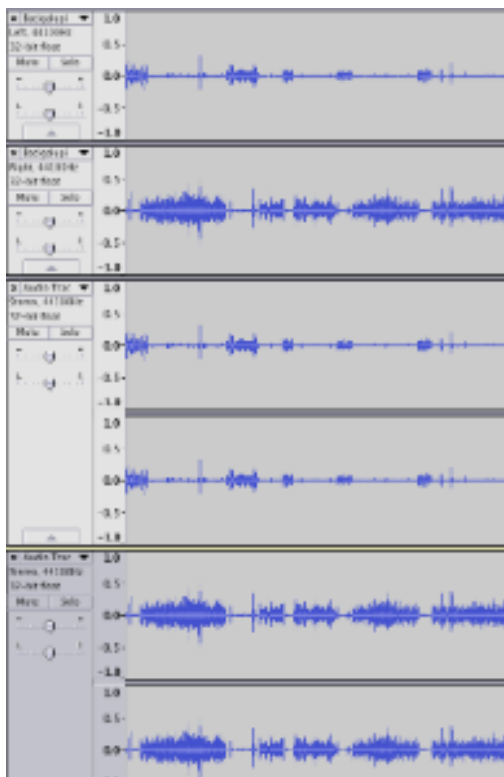
- If you record a conversation/interview through two stand microphones in stereo mode and would like both voices coming from both channels, then open your recording in Audacity.
- Click on the triangle by the name of your audio file on the left, and choose Split Stereo Track from the drop down menu, see screenshot below.



- Then go to tracks > add new > stereo track



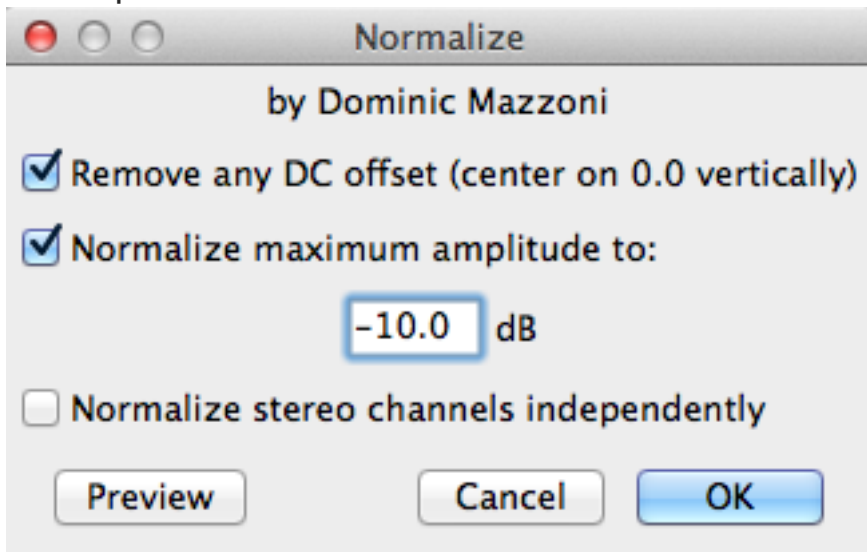
- With the selection tool being selected , select the entire **TOP TRACK (only one track)**, then press **cmd+c** to copy.
- Place your cursor on the stereo track created **in step c.**, hit Home to place your cursor at the very beginning of the track, press **cmd+v** to paste the top track to this stereo track.
- Repeat **step c through e**, to copy and paste the second mono track to the stereo track
- Now you should see total of 4 tracks in your Audacity project: top two are mono tracks, bottom two are newly created stereo tracks (see the screenshot on the left below);
- Delete top two mono tracks by clicking X on the upper left corner of each track and leave **ONLY** bottom two stereo tracks, see the screenshot on the right below.



- Go to top menu File> Export Audio.

## How to normalize a bunch of wav/mp3 files?

- Open the first wav/mp3 file.
- Then File -> Import Audio..., Import the rest of the wav files (or mp3 files) as a batch.
- Edit -> Select All
- Effect -> Normalize, we recommend you to Normalize maximum amplitude to -12 to -8. See the screenshot:



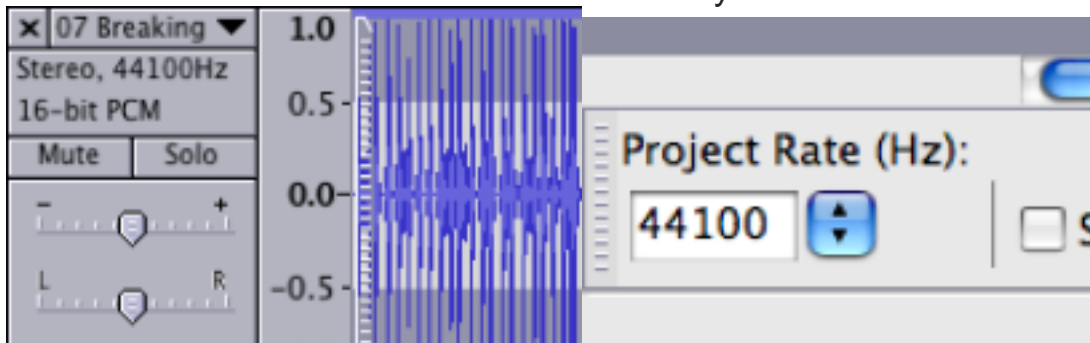
- File -> Export Multiple  
Be sure to select a different folder when Exporting & make sure to select wav/mp3. This way your original files will not be accidentally overwritten.

## Importing an audio file into Audacity

**5. Importing an Audio File:** To bring a file into Audacity go to **file > import > audio** navigate to you audio file and click **open**. Alternatively you can drag and drop the file onto the Audacity screen.



Your imported file should now be viewable in the Audacity screen. To play the track press the green play button in the upper left, or with the track highlighted press the **spacebar**. You will notice the sample rate and format of the imported track listed below the track title, this will match the project rate shown in the bottom left of the Audacity screen.



track sample rate

project sample rate

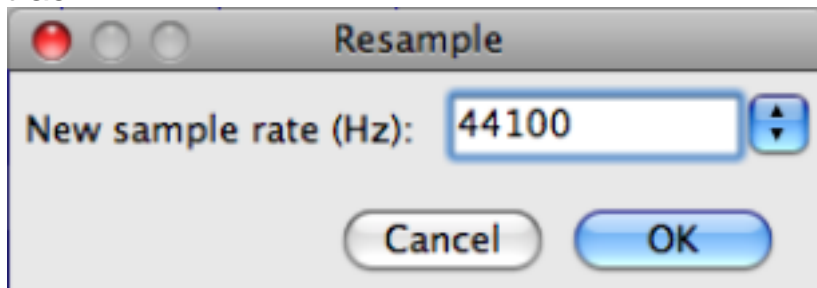
**6. Mixed Sample Rates:** It is possible to have multiple audio tracks in audacity with sample rates that do not match.

A. For example, the first track you import into a new project is a 44100 Hz music file ripped from a CD. The project rate will automatically be set to 44100 Hz. Next you import a voice recording with a 22050 Hz rate. Playback for both tracks will sound undistorted at the higher project rate. And, when you export the file, audacity will default to the 44100 Hz project rate.


B. Now let's say the 22050 Hz voice recording is imported first. In this case the project rate will be set at the lower sample rate. Realistically

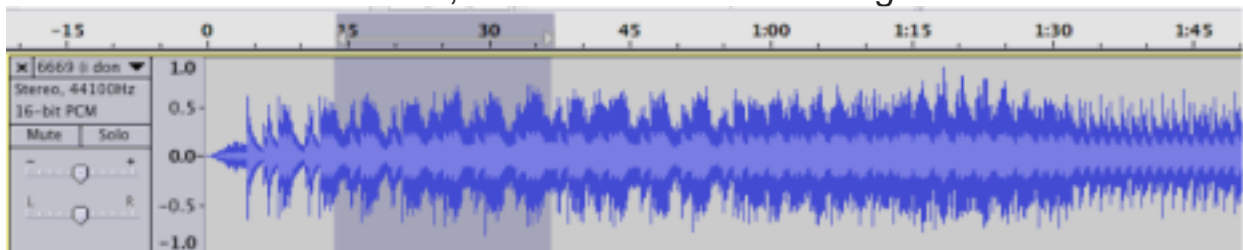
the difference is far too subtle to hear during playback, but some of the original signal information will be lost at export. To prevent this, change the project sample rate from the drop down menu at the bottom left of the screen to match the highest track sample rate.

- C. Finally, what if you need to copy a segment of audio from a 44100 Hz track and paste it into a 22050 Hz track? For this you will need to resample the lower rate track. To do so, highlight the track to resample by clicking anywhere on the track. Go to **tracks > resample** and select the target sample rate. Click Ok and Audacity will convert the track.



## Editing Audio Tracks in Audacity

Making a Selection: Use the **selection tool**  to highlight a segment of audio. After making the selection press play, playback starts from the beginning of your selection area. To extend or shorten this selection, hold **shift** while clicking on a spot outside of the selection area to add, or inside the selection region to shorten.



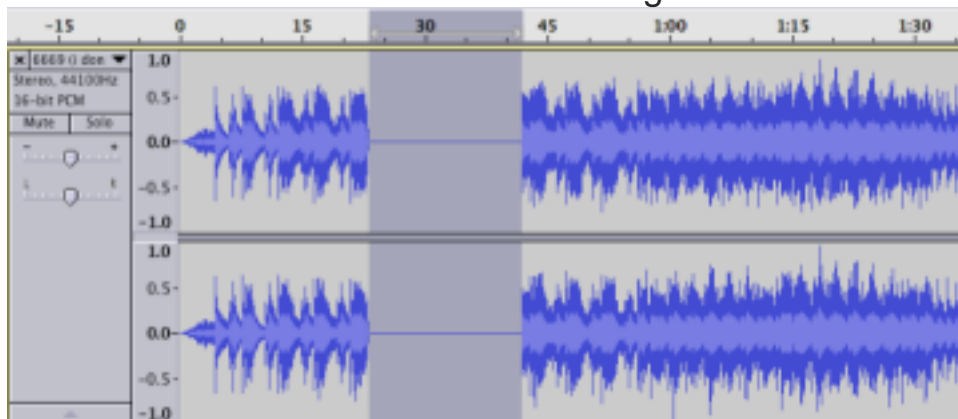
2. Cut/Copy/Paste: To remove unwanted portions from your track highlight the region to remove and press **delete**. To cut and paste the selection press **ctrl+x** to cut (**cmd+x** on mac), position the cursor at the desired insert position and press **ctrl+v** to paste (**cmd+v**). If you make a mistake **ctrl+z** (**cmd+z**) will undo the last action.
3. Duplicating: You can also copy (**ctrl+c**) (**cmd+c**) a short segment from the original recording and paste it into a new track. To get a new blank



track, go to **tracks > add new > stereo track**. Or, with the selection highlighted, go to **edit>duplicate** and your segment will be duplicated into a new track.



4. Moving Audio: The **time shift tool** is used to reposition audio within the track. With the time shift tool selected **hold left click >** and **move the cursor left/right**. This moves the entire track regardless of any area you might have highlighted.
5. To move just a segment, you will first need to split the track. Position the **selection tool** at the point to split, go to **edit > clip boundaries > split (cmd/ctrl+l)**. You can now use the **time shift tool** to move the newly detached segment independently.
- A. Insert Silence: To remove a segment while maintaining the original track length, use insert silence instead of deleting the segment. With the portion to remove selected, go to **Generate> Silence**. This will flat line the track at the selected region.




6. Effects : To create a more subtle transition between audio and silenced portions use fade-in and fade-out located under **effect**. Highlight the amount of audio you would like to use for fade out. Go to **effects > fade out**. Audacity will apply the effect over the duration of your chosen segment.



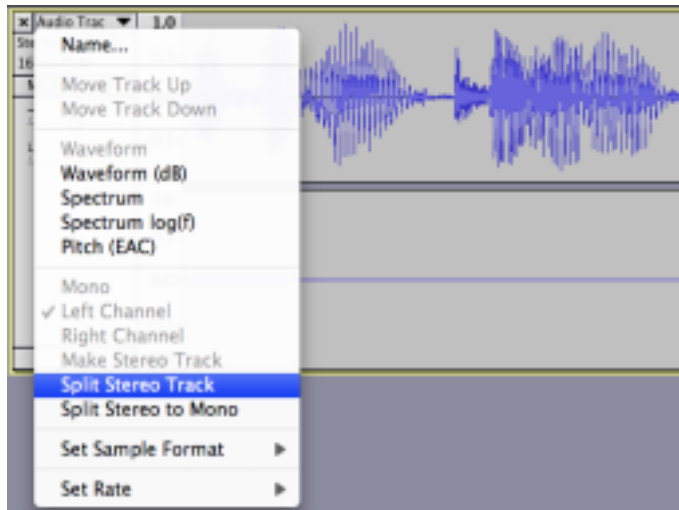
Using this same technique, you can amplify the volume of a segment, create a wah wah effect, reverse the audio, etc. Interesting results can be achieved through duplicating the segment into a new track (as described in 3 above) and applying separate effects to the copied pieces.

7. Converting Mono to Stereo: Recordings from monaural devices (such as the microphone in the DMC recording booth) will produce single channel audio tracks. To create a stereo pair, go to **tracks > add new > stereo track**.

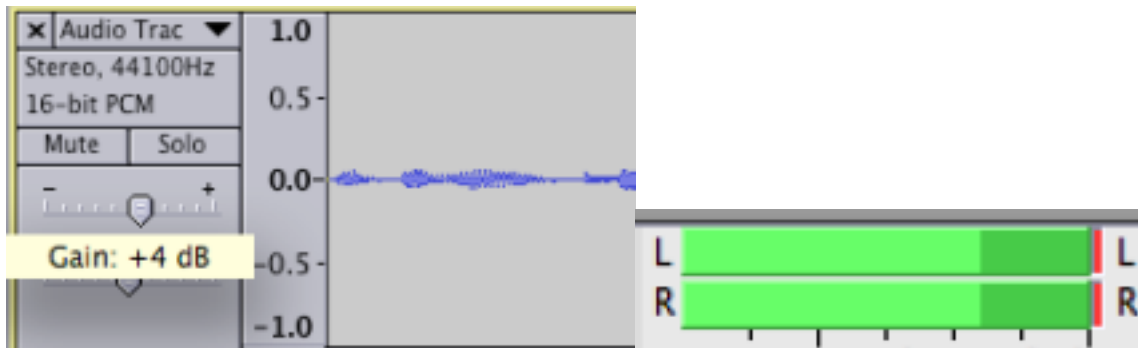


With the **selection tool**  , click anywhere in the original track and press **ctrl+A (cmd+a)** to select all, then **ctrl+c (cmd+c)** to copy. Now click in the newly created stereo track and press **home** to position the cursor at the beginning, now **ctrl+v (cmd+a)** will paste the mono track into the stereo track and automatically give you a left and right channel.

A. If you have unintentionally made a mono recording within a stereo track, you can split the left and right channels and delete the silent portion. Open the drop down menu next to the track title and choose **split stereo track**. The channels will now be separated and you can close the silent track.



**10. Increasing Volume:** To increase the volume of a quiet track the easiest method to use is the gain slider beneath the track name.

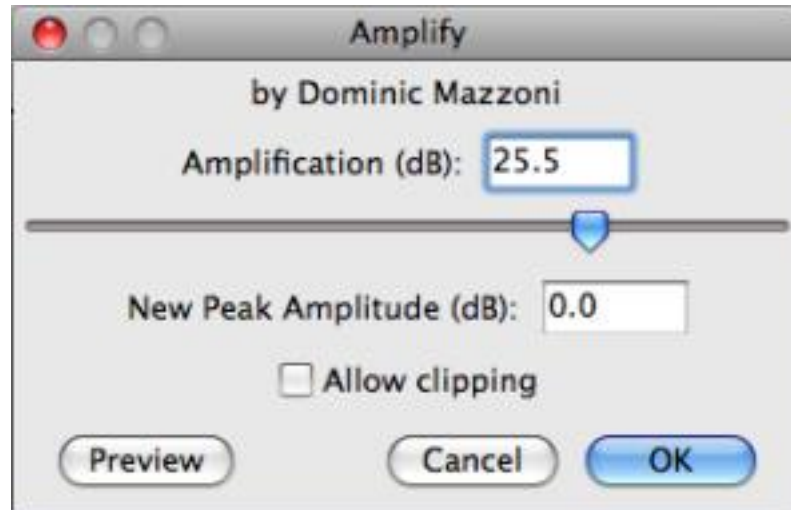


gain slider

output meter

After making gain adjustments, play the track and keep your eye on the output meter, if the meter peaks out, it will leave red bars at the end. This means the track is too loud and will be distorted, adjust the gain back down until red no longer shows up in the output meter.

The gain slider increases volume for the entire track, to increase just a small segment, highlight the area with the **selection tool** and go to **effect > amplify**.

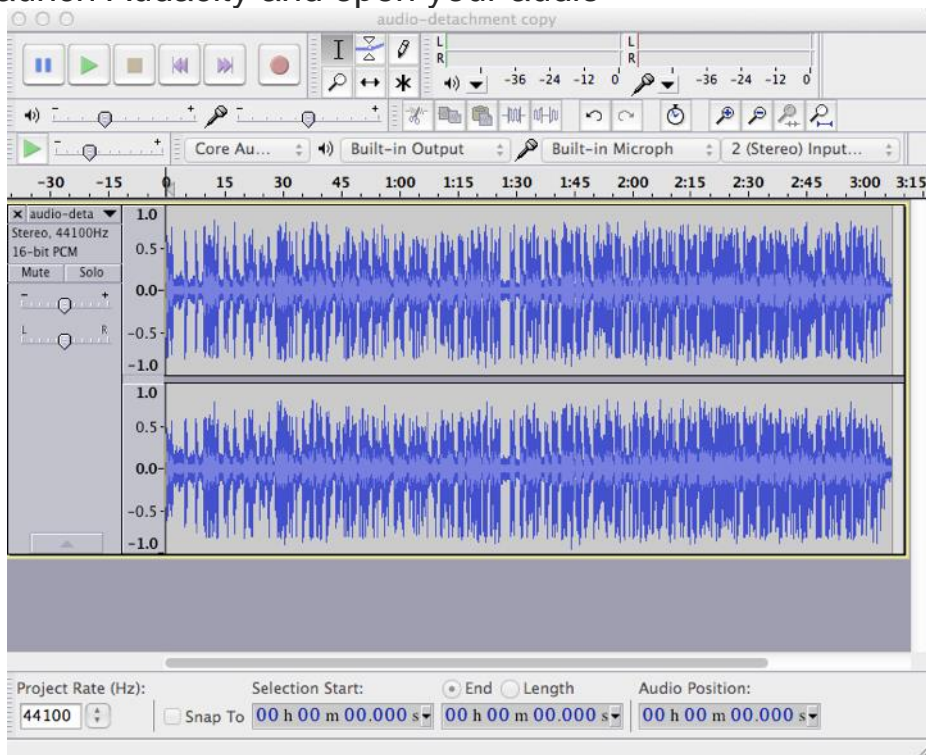


## Noise Removal Via Audacity

**Noise Removal** – is the way by which we can remove background noise from our recordings.

Steps to remove Noise

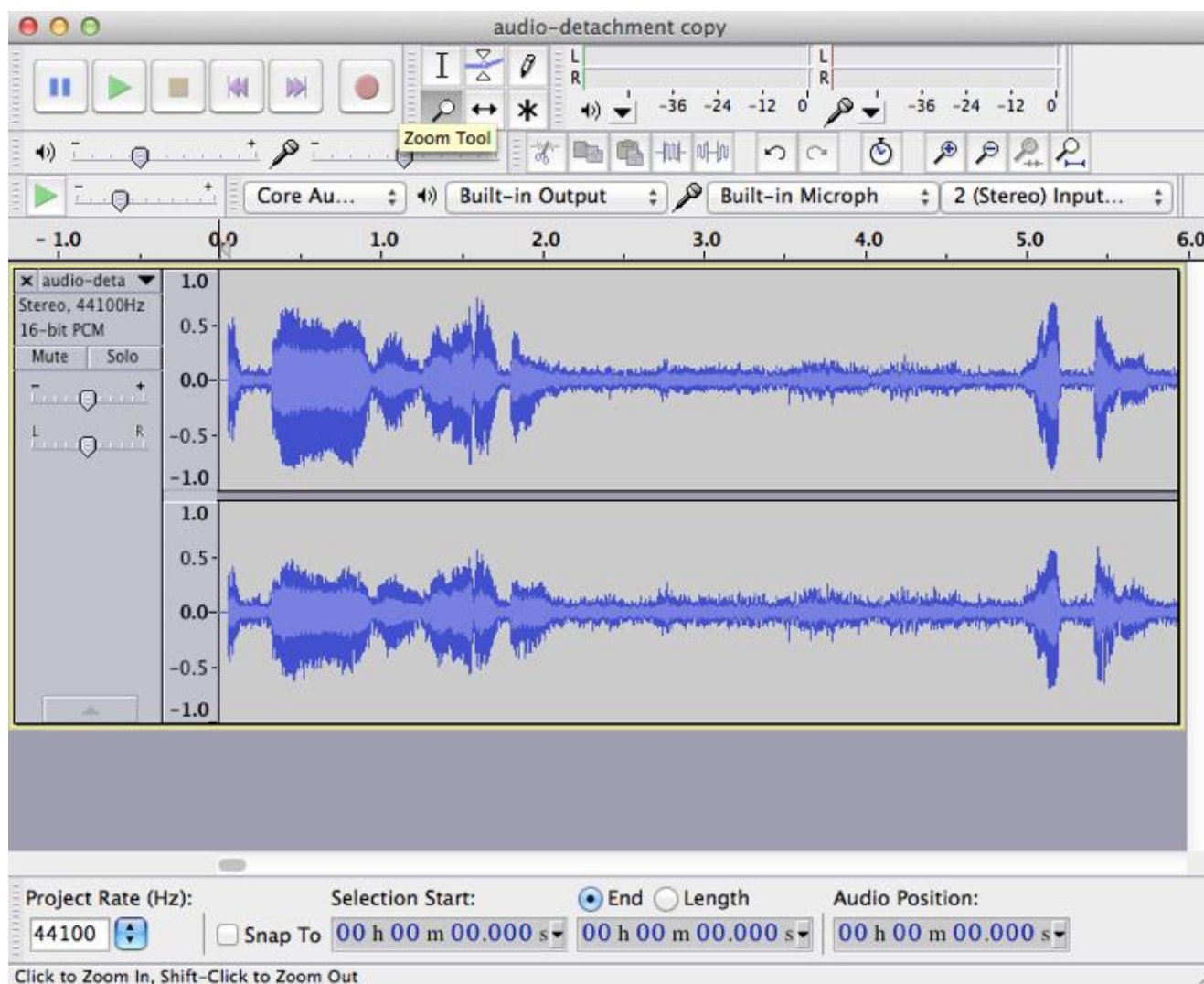
- Launch Audacity and open your audio



*The screenshot shows the entire clip of 3 min duration.*

2. Identify what part of your sound file is noise. For this “ZOOM IN” to your selection. Screenshot shows the **Zoom Tool**.

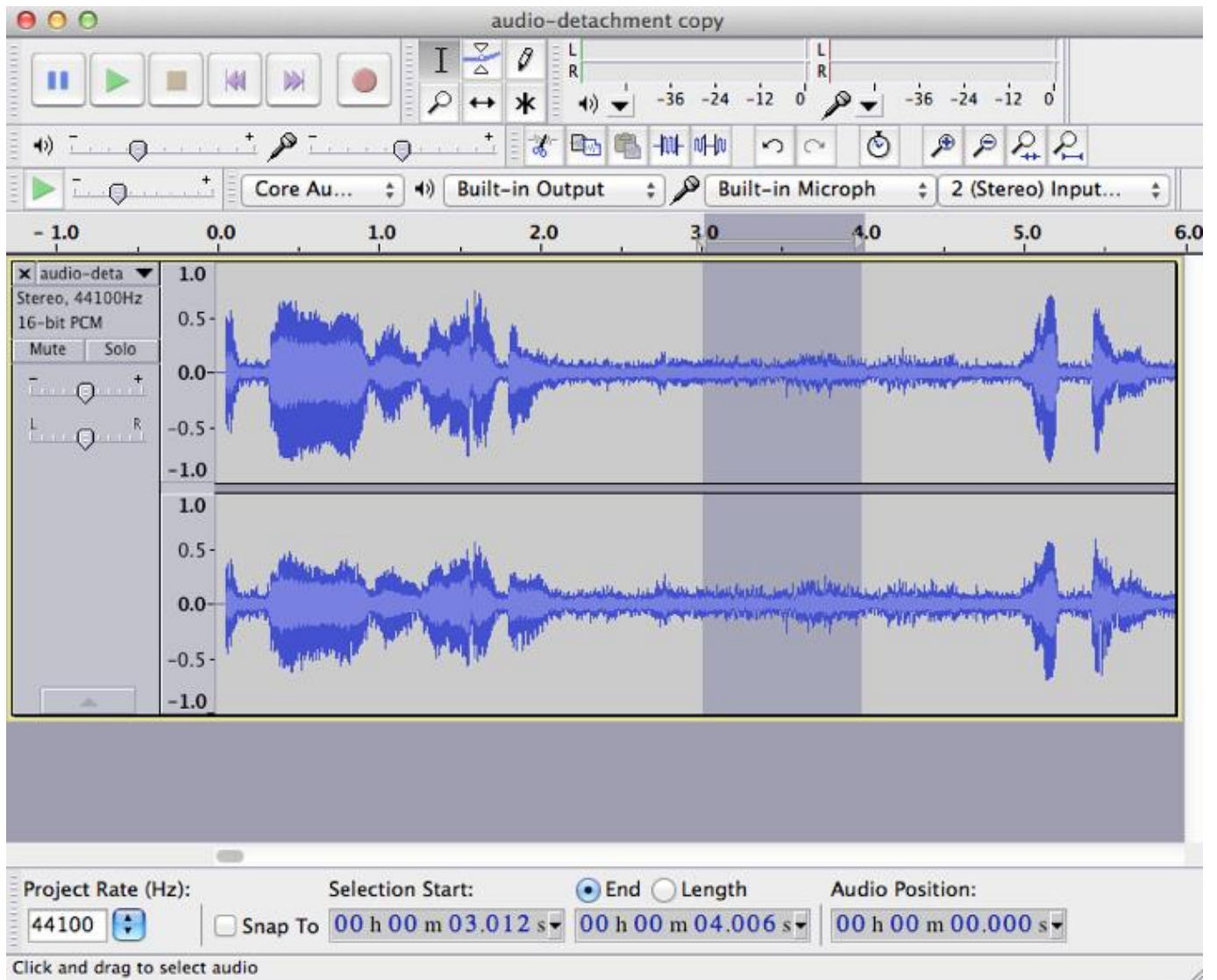
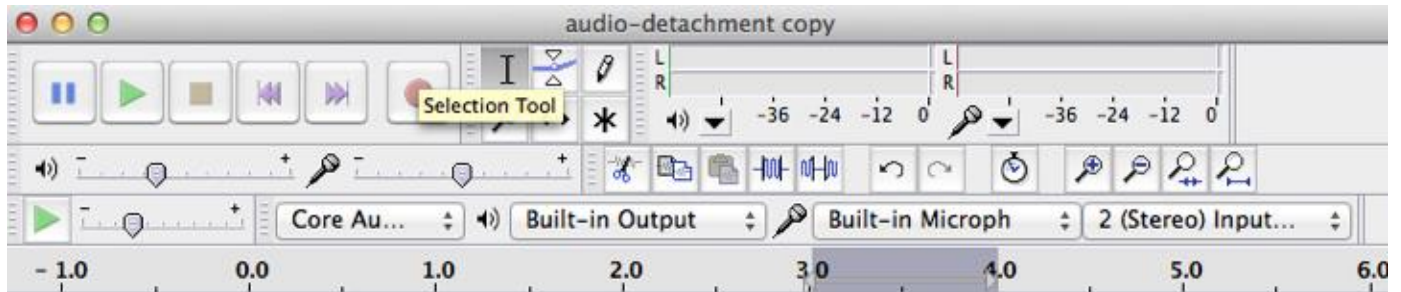
Click on the tool. Click on the audio file, the audio from 0 sec to 6 sec is zoomed in.



3. To get Noise sample/Noise Profile – the clip from 3 sec to 4 sec is the white noise. Click on **Selection Tool** highlighted in screenshot.

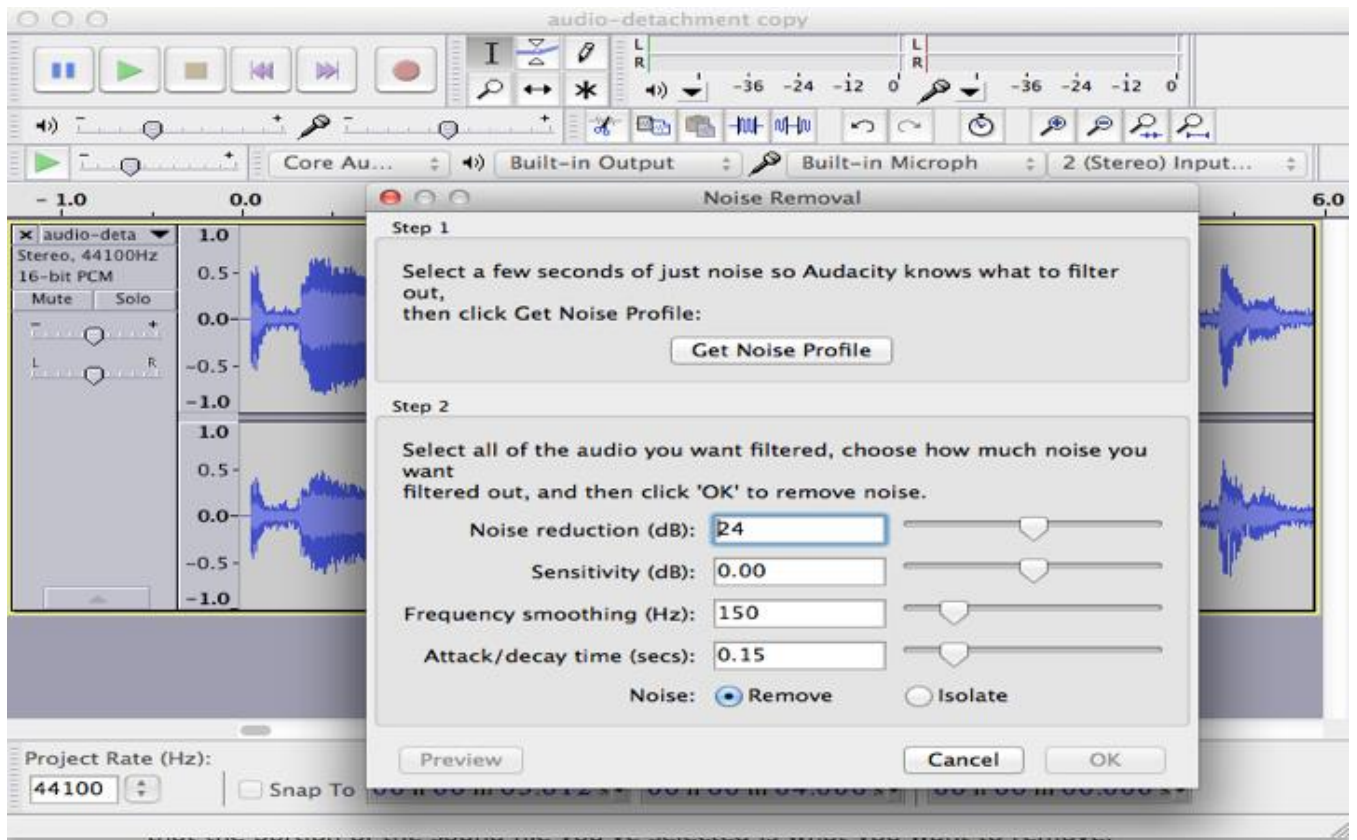
Place your mouse at the start of your noise sample (i.e at 3 sec), then click and drag across the part of your file that has the noise in it (till 4 sec).

It should be a part of the file that is *only* noise.



4. Next, from the menu, choose **Effect - Noise Removal**.

On the Noise Removal window that comes up, click **Get Noise Profile** to tell Audacity that the portion of the sound file you've selected is what you want to remove.



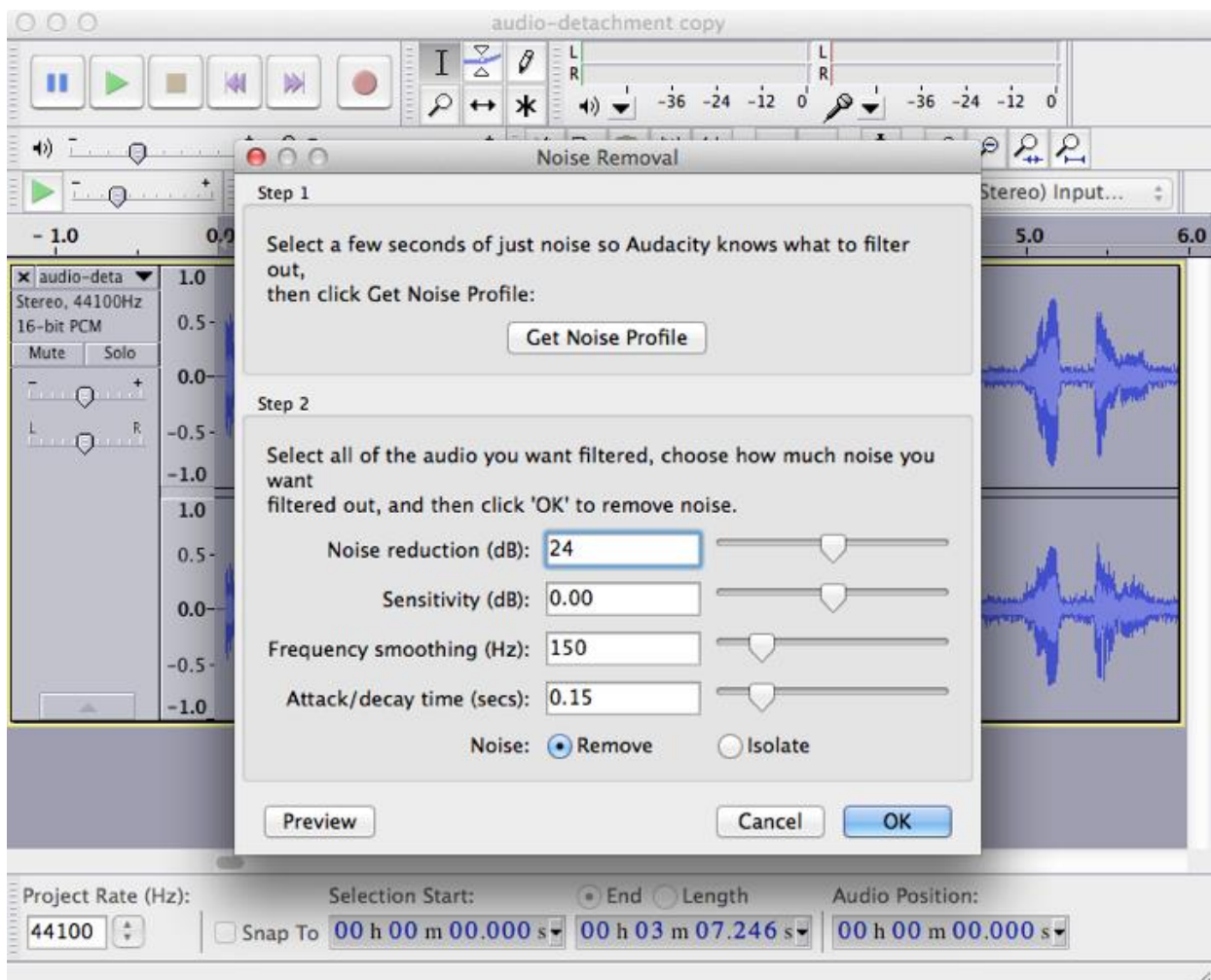
5. After you've set your noise profile, select the entire sound file by clicking on left panel



6. Then, choose **Effect - Noise Removal...** from the top menu again. You can adjust the amount of noise you want to remove by sliding the bar to the left or right.

Click on **OK** button at the bottom of the Noise Removal window.

**Note:** Click the **Preview** button to hear what your new file will sound like without the noise in it.



## 7. Setting the parameters

**2 Noise Reduction (dB):** Controls the amount of volume reduction to be applied to the identified noise. Use the lowest value that reduces the noise to an acceptable level. Higher values than necessary may make the noise even quieter, but will result in damage to the audio that remains.

**3 Sensitivity:** Controls how much of the audio will be considered as noise, on a scale of 0 (minimum) to 24 (maximum). Greater sensitivity



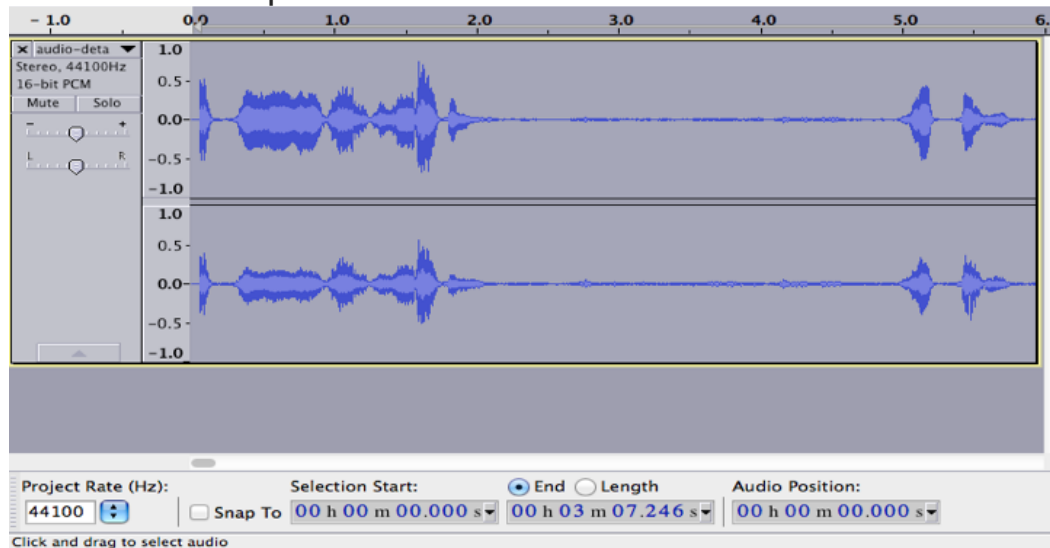
means that more noise will be removed, possibly at the expense of removing some of the desired signal as well. Lower values may result in the appearance of **Artifacts** in the noise-reduced audio. Set this control to the lowest value that achieves effective noise removal without the introduction of **Artifacts**.

4 **Artifacts**: These typically consist of random bursts of very short tones at random frequencies, sometimes called “musical noise”, “bird song” or “tinkly-bells”.

- **Frequency Smoothing (bands)**: Like sharpening or blurring a photo, the bigger the Hz the more blurred everything will sound, the smaller the number, the sharper.
- **Attack/decay time (secs)**: Attack/decay means how fast the noise reduction takes hold and lets go, either side of a desirable sound – a word or a sentence.

8. Remove the noise

The noise will be removed from your file, and this is how it will look. Notice the difference in peaks of static noise.



9. If you don't like how it sounds, you can choose **Edit - Undo Noise Removal** to undo your changes.