Astronomy Podcasting

George J. Bendo

Podcasts are audio programs that meet the following criteria:

- The programs are in an audio (not video) format.
- The audio is distributed using the internet.
- The audio material is episodic (not continuous).
- The distribution system uses RSS feeds.

Podcasts could otherwise be any length and cover any topic (music, history, sports, news, science, comedy, fiction, etc.).

Podcasts were originally invented in 2004 by Adam Curry (who played music videos on MTV in the 1980s) and David Winer (a software developer).

The name “podcast” was invented by journalist Ben Hammersley about a month after the podcast was invented.

About 5 million podcasts with 70 million episodes currently exist.

Multiple space and astronomy podcasts are available online in the English language:

365 Days of Astronomy


Ask a Spaceman

Astronomy Cast


Awesome Astronomy

Cheap Astronomy

Naked Astronomy

The Orbital Mechanics


Space Nuts

Star Diary

StarTalk Radio

The Supermassive Podcast


Universe Today

It is possible to find multiple astronomy and space podcasts in a few other languages (e.g., Spanish, French, Japanese).

In Turkish, I found the following:

 Uzay Hakkında Her Şey! Rege ile Uzay [currently inactive]

 Dinçer Güner ile Minik Astro Tüyolar

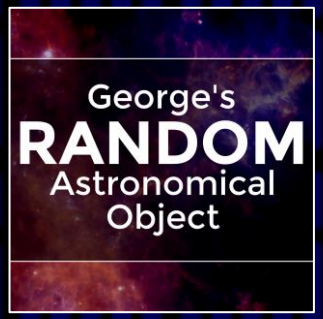
In Urdu, I found the following:

 Hamari Kainat

I could not find astronomy or space podcasts in Farsi, Kazakh, or Uzbek. (I also had problems searching for Georgian language astronomy podcasts.)

I personally have been involved with two podcasts.

The Jodcast
www.jodcast.net



George’s Random Astronomical Object
www.randomastronomicalobject.com

The Jodcast was started by postgraduate students at Jodrell Bank Observatory in 2006. Since it was one of the few astronomy podcasts when it started, it tried to cover multiple topics (news in astronomy, astronomy research, amateur stargazing, and question and answer sessions).

I started working with the Jodcast in 2012 and became a regular contributor, which included editing and producing the podcast.

Unfortunately, people had difficulty producing the Jodcast during the pandemic, and its last episode was published in December 2021.

I created George's Random Astronomical Object on my own. The first episode was published in August 2019.

The episodes discuss individual astronomical objects that are selected randomly. The idea was to discuss astronomical objects (and astronomy concepts) that are generally not covered by other astronomy media published for the general public (books, TV programs, podcasts, etc.).

The episodes are published once every two weeks. The final episodes are typically 5-15 minutes in length. I record and edit the audio myself.

The rest of this presentation is focused on producing a podcast (particularly an astronomy or science podcast) based mainly on my experience.

The following steps are needed to create a new podcast:

- **Concept**
- **Cover Art**
- **Scripting**
- **Recording**
- **Editing**
- **Website**
- **Distribution**
- **Publicity**

Concept

Any podcast should be created with some basic idea of what the podcast is going to be. This involves making several basic choices about the podcast:

- What will the podcast be named?
- What subject will the podcast cover?
- Who is the podcast aimed at?
- What language will the podcast be in?
- Who will speak on the podcast? How many people will be speaking?
- What type of format will be used (monologue, conversational, questions and answers, etc.)?
- How long will each podcast episode be?
- Who will edit the podcast and take care of the publishing?
- How frequently will the podcast be published?

The subject matter and format could vary significantly. For example, an astronomy podcast could be set up as one of the following:

- One person describing the monthly night sky for amateur stargazers.
- One person describing deep sky observing for experienced amateur astronomers with telescopes.
- One person describing the myths associated with the constellations in the night sky.
- Two or more people teaching basic astronomy concepts for people who do not understand astronomy.
- Two people discussing recent news in astronomy or space exploration.
- One person interviewing a different professional astronomer in each episode about their research.
- Two people discussing questions about astronomy from the general public.

Keep in mind that a lot of astronomy podcasts already exist, so to create a new podcast that distinguishes itself from other podcasts, it would be useful to do something different:

- Cover different subject matter from other podcasts.
- Discuss material relevant to a specific location (e.g. astronomy in the place where you are from).
- Produce a podcast in a different language (not English, for example).
- Produce material in a different format (for example, using music).

Also keep in mind that different podcasts will age differently:

- Podcasts about recent events (for example, the latest astronauts to travel into space) or about time-dependent activities (for example, observing the night sky on a different month) will not be worth listening to about a month after they have been published.

- Podcasts about broader concepts (for example, the latest research activities of professional astronomers) will last for much longer, but some topics may get out of date after a few years.

- Podcasts discussing more general topics (basic astronomy concepts) should last for a very long time.

The length of a podcast could be as short as 5 minutes or as long as 6 hours.

Podcasts could be released on various timescales, including once every day, once every week, or once every month.

Keep in mind that if you produce too much audio material (either too many podcasts or podcasts that are too long), it might be too difficult for people to listen to everything.

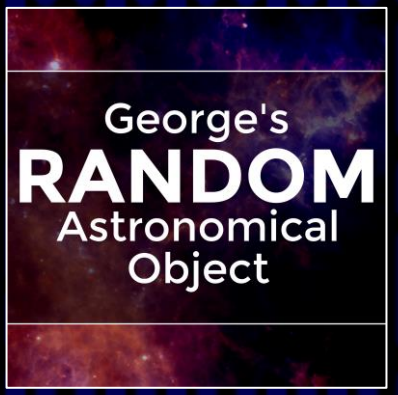
Also keep in mind that you need to be able to actually produce your podcast. Recording and editing can take an amount of time several times longer than the podcast itself. Don't publish a 1 hour podcast every week if you don't have the time to do this.

Related to this, do not make your podcast too complicated or require work from too many people. This will make the podcast very difficult to produce.

Very importantly, try to publish the podcast on a regular schedule and on time.

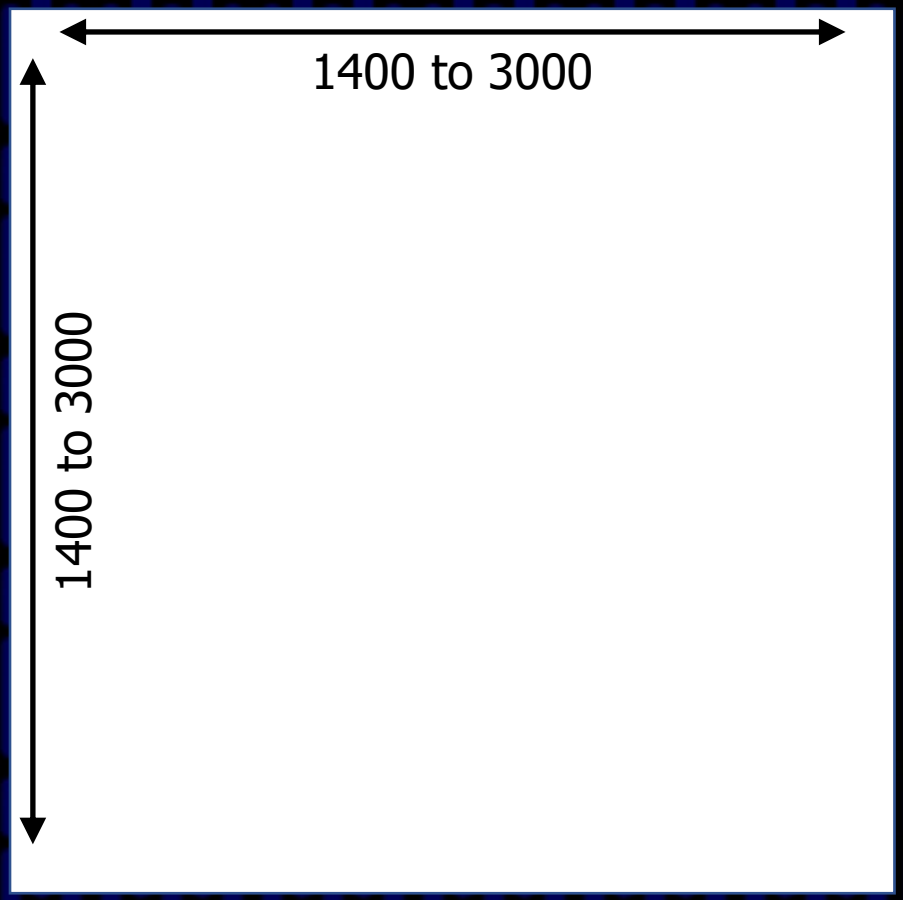
Cover Art

Podcasts need a logo to represent their podcast and to attach to the audio file.

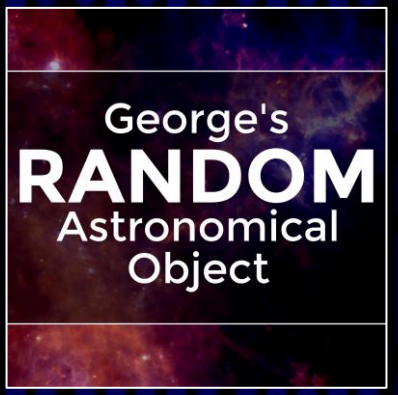


From a technical standpoint, the cover art should be formatted as follows:

- Square.
- 1400 x 1400 to 3000 x 3000 in size.
- JPG or PNG format.



From a design standpoint, I strongly recommend including the title in the cover art and using a font that is large and easy to read. Including other graphics in the image would help to make it stand out.



Very importantly, make the text and design easy to see when the cover art is shrunk to a very small size (for example, 2 cm x 2 cm). Do not include too much detail or use fonts that are too complex.

Scripting

For most formats, it would be useful to have a script for the podcast.

For some formats (like a casual conversation), a detailed script may not be necessary, although it will still be very helpful to write down some details for discussion.

For other formats (like a monologue or a question-and-answer format), it may be much better to write a complete script first.

A typical podcast may follow a basic format like the following:

Introduction (the name of the podcast, the presenters, and the website)

Science Content

Listener Feedback

End credits (the names of the editors, other contributors, etc.)

The scripts and format for each episode do not necessarily need to follow exactly the same format.

For your podcast's website, it would be useful to have a transcript of each of your episodes. (Some people may be more interested in reading your podcast's transcripts than listening to the episodes.)

Also, try to find references for everything you say on your podcast, and try to place that information on your website.

Recording

While it is possible to record using the microphone built into a phone or laptop computer, the sound quality may not necessarily be very good (but if it is, that's OK).

Most beginner podcasters will buy a USB microphone.

I use two different microphones:

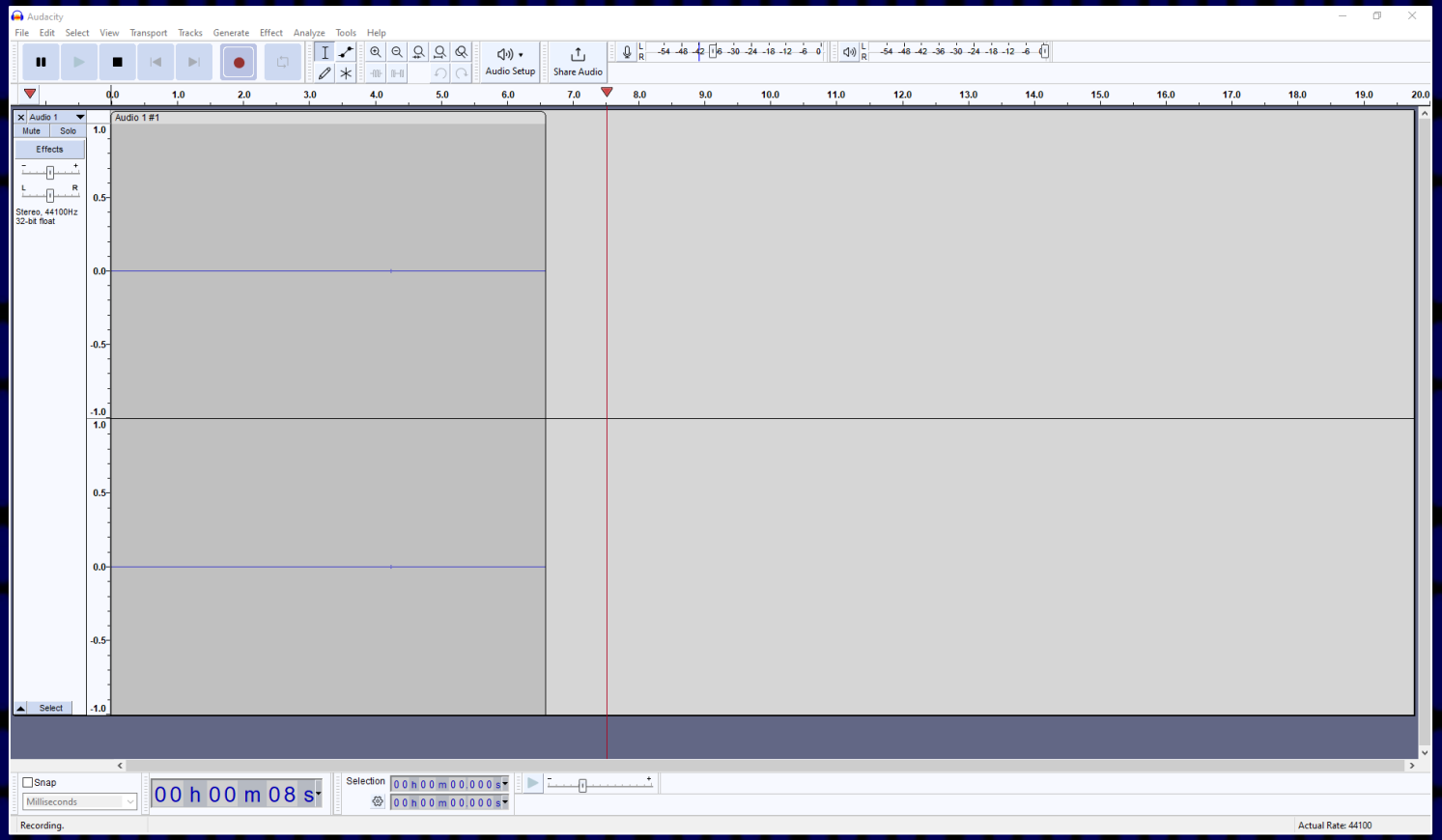
- Blue Yeti
  - For recording at home
  - €130

- Samson Q2U
  - Portable microphone
  - €60

I also use a sound shield at home.

I make recordings using Audacity (www.audacityteam.org), which is free to use.

Audacity saves audio in its own format (aup3), but you should also save recorded audio in wav format.

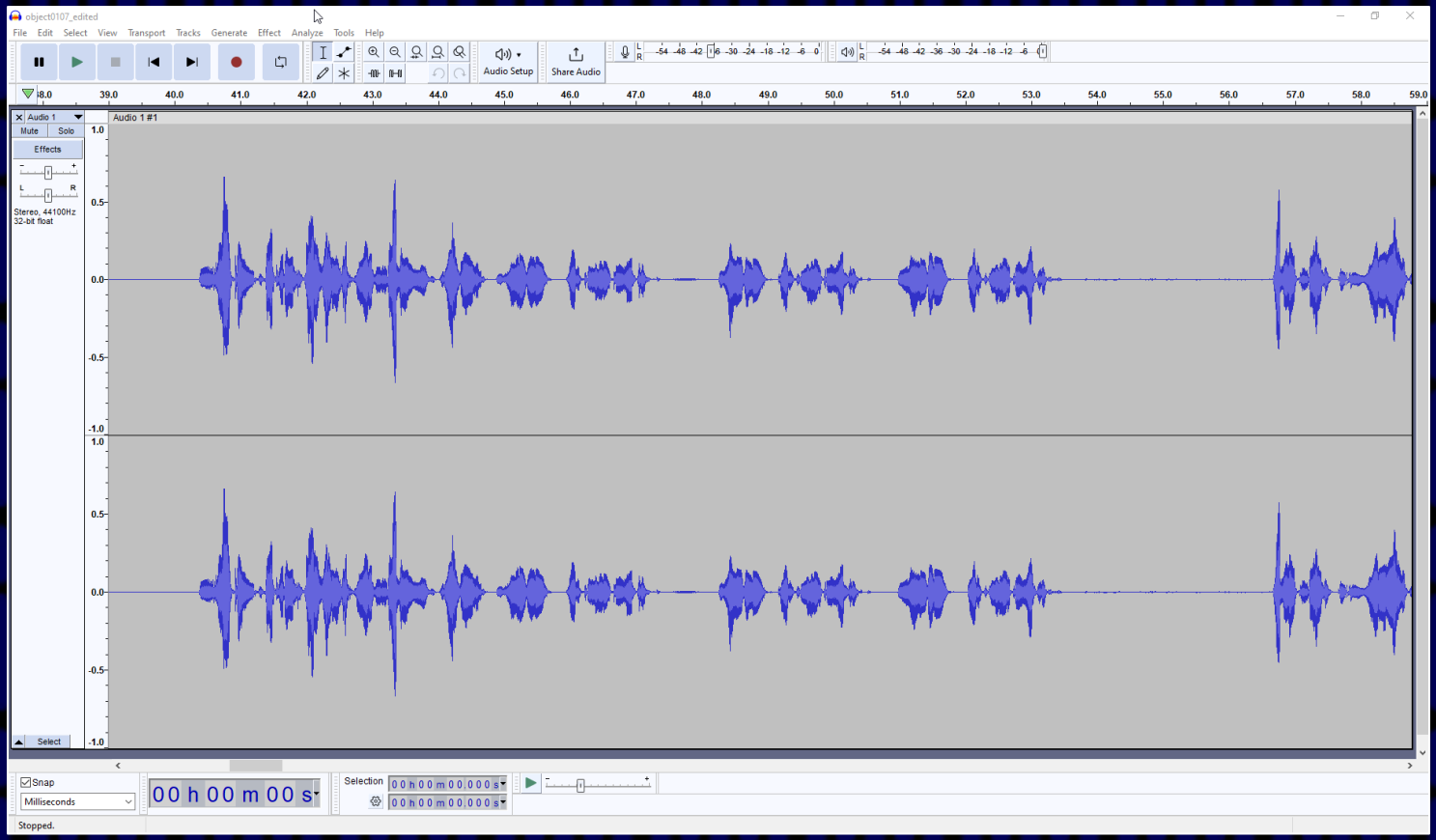


When recording, I recommend the following:

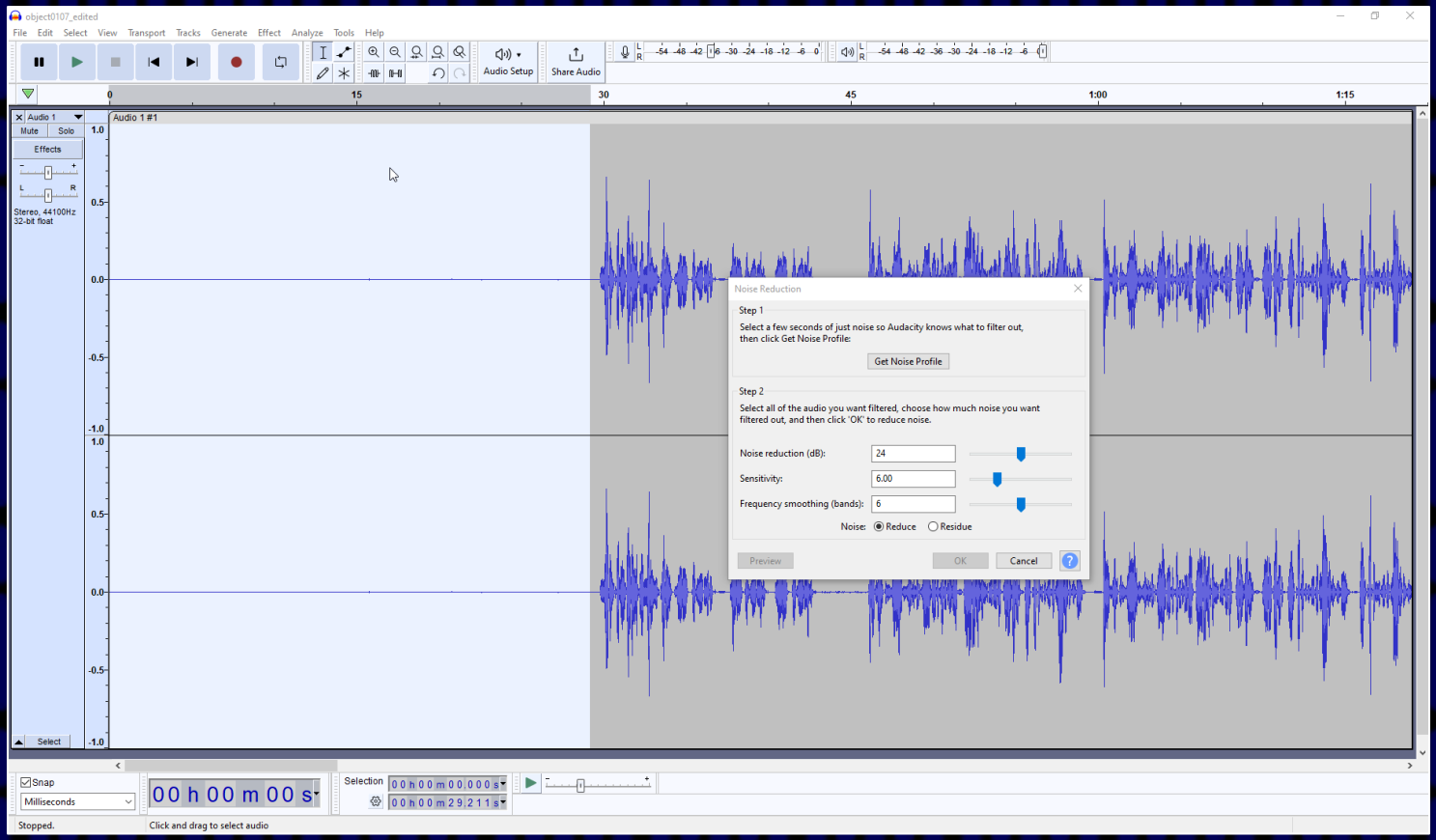
- Record 5-10 second of silence at the beginning of any audio recording. This is important for audio editing.
- Talk directly into the microphone. Do not move your head.
- Avoid moving (including making hand gestures) or making other noises.
- Talk naturally. Try to avoid sounding like you are reading.
- When recording with two or more people, people should try to only talk one at a time.
- When you make a mistake, go back to the beginning of the sentence you were saying and start over.

Editing

I do all of my audio editing in Audacity.



At the beginning of editing audio, I use noise removal (under Effects) to remove the noise. This involves first using the silence at the beginning of the recording to measure the noise and then selecting all audio and performing the noise removal.



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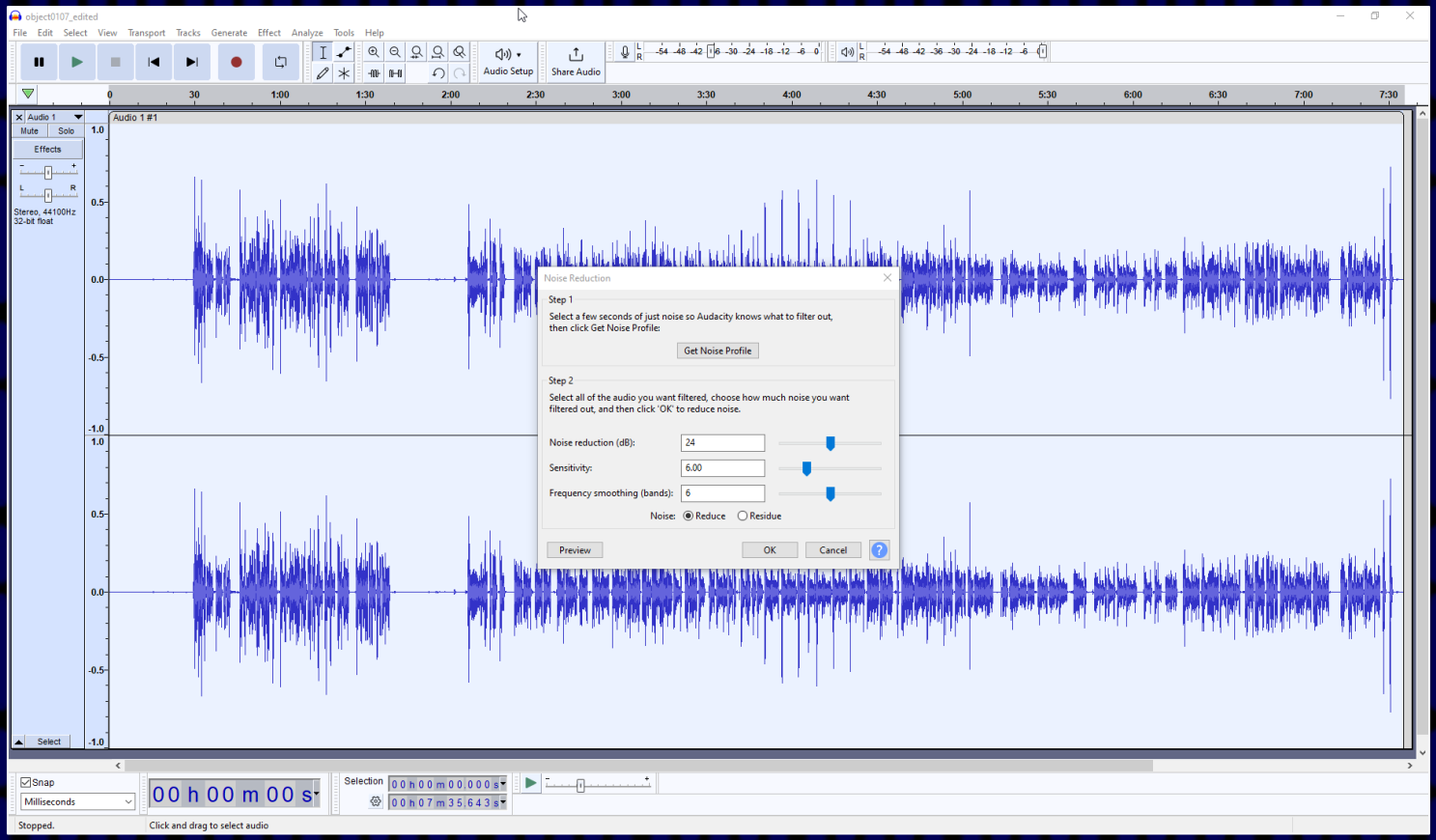
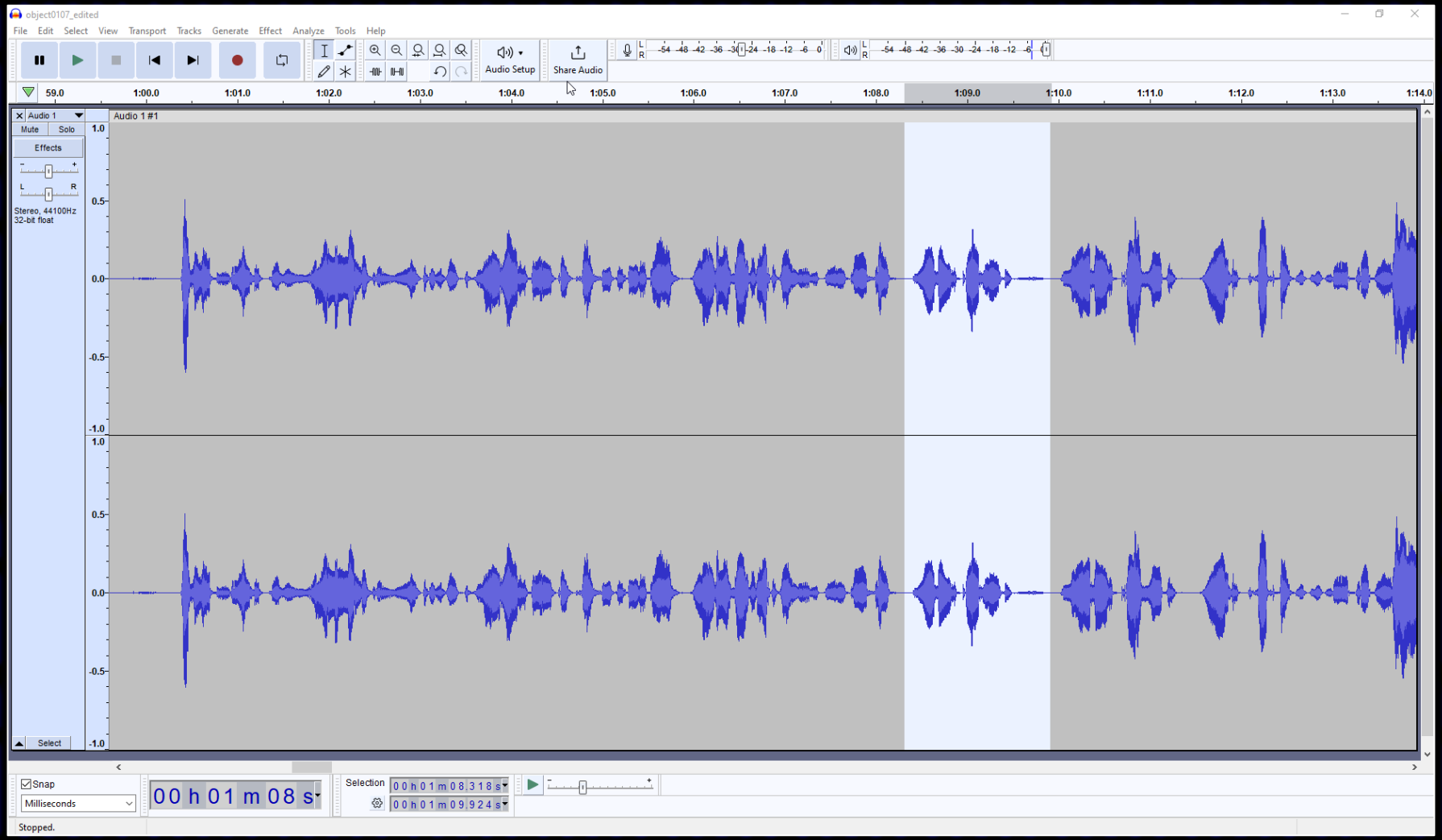
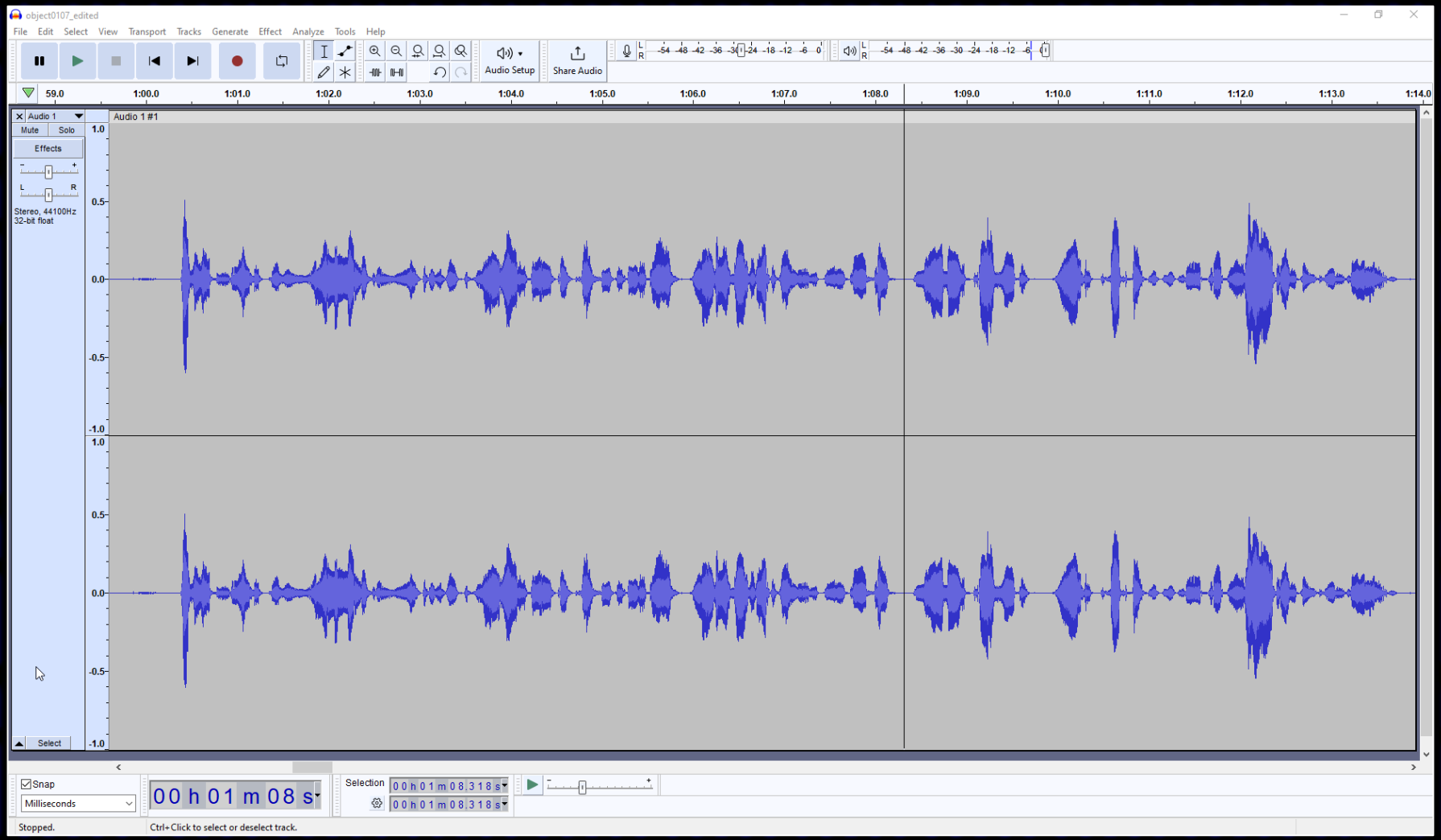
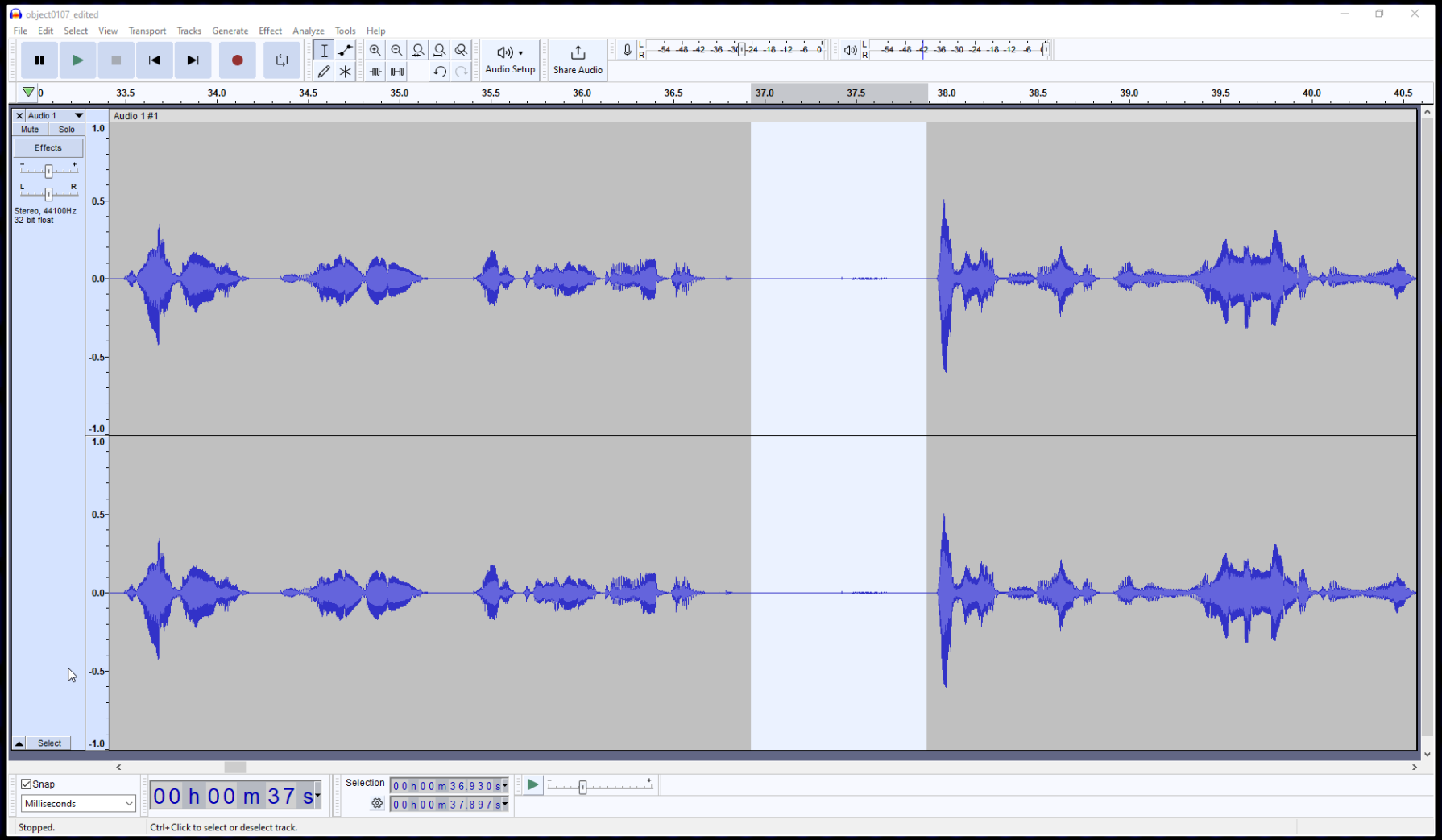


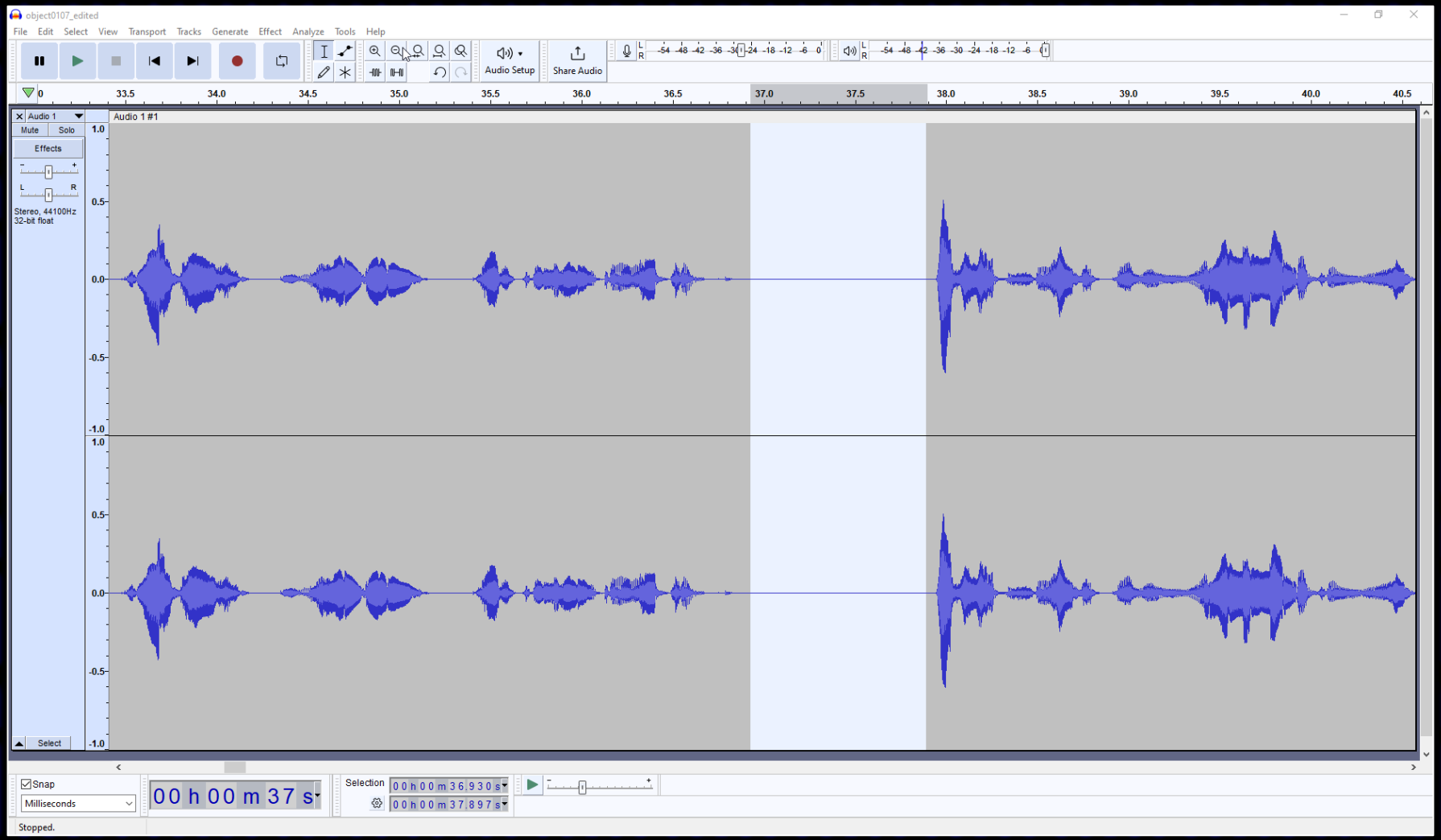
Going from the beginning to the end, I do the following:

- Delete audio where I made mistakes.
- Delete “um”, “uh”, and related sounds.
- Mute breathing sounds.
- Delete or mute “mouth sounds”.
- Adjust the silence between sentences, phrases in sentences, and “paragraphs”. (I typically try to have 1.1 seconds between sentences.)


object0107_edited
File Edit Select View Transport Tracks Generate Effect Analyze Tools Help
Audio Setup
Share Audio
Audio 1
Mute Solo
Effects
Stereo, 44100Hz
32-bit float
Audio 1 #1
Select
Snap
Milliseconds
00 h 01 m 08 s
Selection
00 h 01 m 08,318 s
00 h 01 m 09,924 s
Stopped.


object0107_edited
File Edit Select View Transport Tracks Generate Effect Analyze Tools Help
Audio Setup
Share Audio
59.0 1:00.0 1:01.0 1:02.0 1:03.0 1:04.0 1:05.0 1:06.0 1:07.0 1:08.0 1:09.0 1:10.0 1:11.0 1:12.0 1:13.0 1:14.0
Audio 1
Mute Solo
Effects
Stereo, 44100Hz
32-bit float
Audio 1 #1
1.0 0.5 0.0 -0.5 -1.0
Select
Snap
Milliseconds
00 h 01 m 08 s
Selection
00 h 01 m 08,318 s
00 h 01 m 08,318 s
Stopped.
Ctrl+Click to select or deselect track.


object0107_edited
File Edit Select View Transport Tracks Generate Effect Analyze Tools Help
Audio Setup
Share Audio
Audio 1
Mute Solo
Effects
Stereo, 44100Hz
32-bit float
Audio 1 #1
Select
Snap
Milliseconds
00 h 00 m 37 s
Selection
00 h 00 m 36,930 s
00 h 00 m 37,897 s
Stopped.
Ctrl+Click to select or deselect track.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32-bit float
Audio 1 #1
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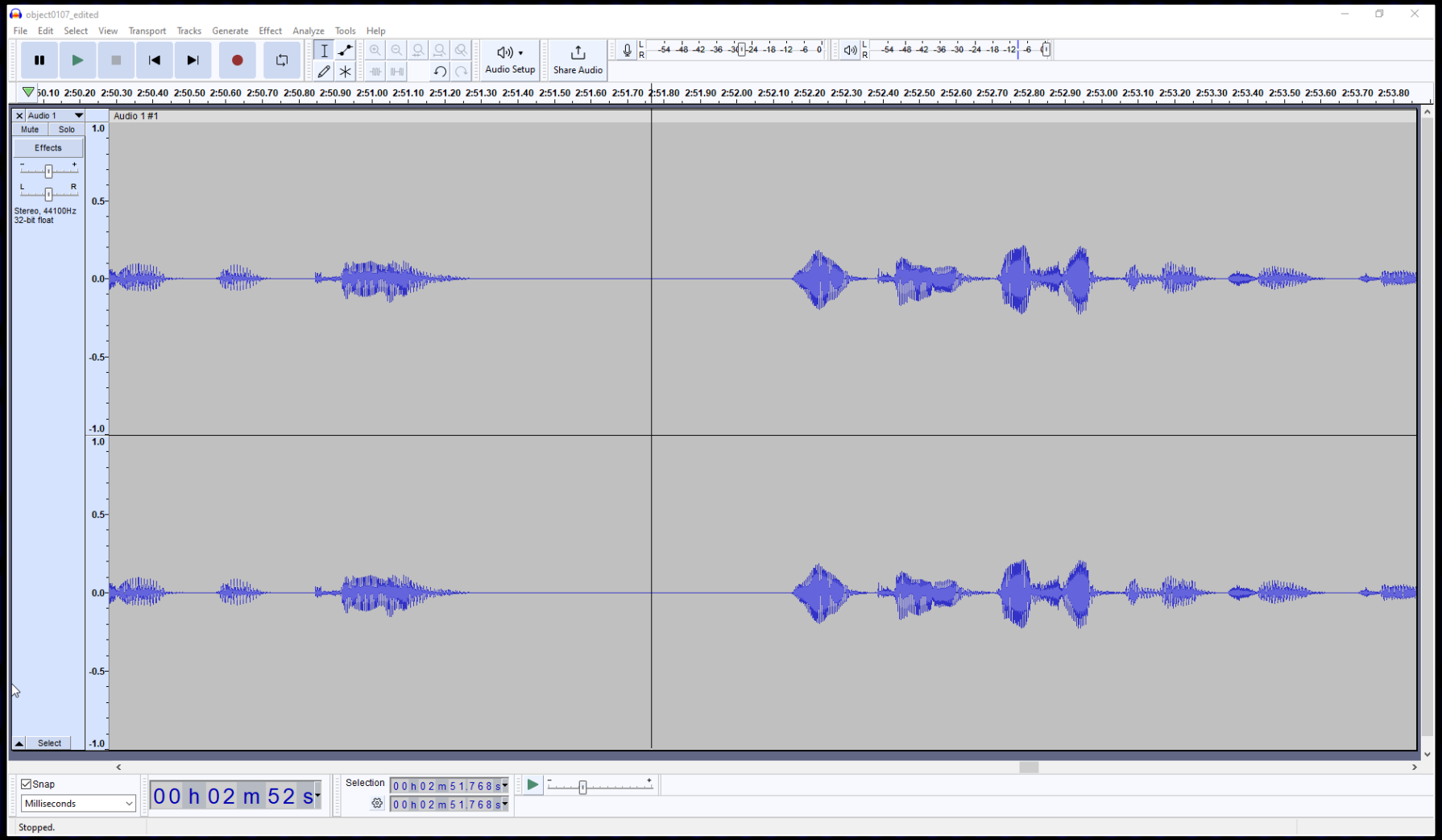
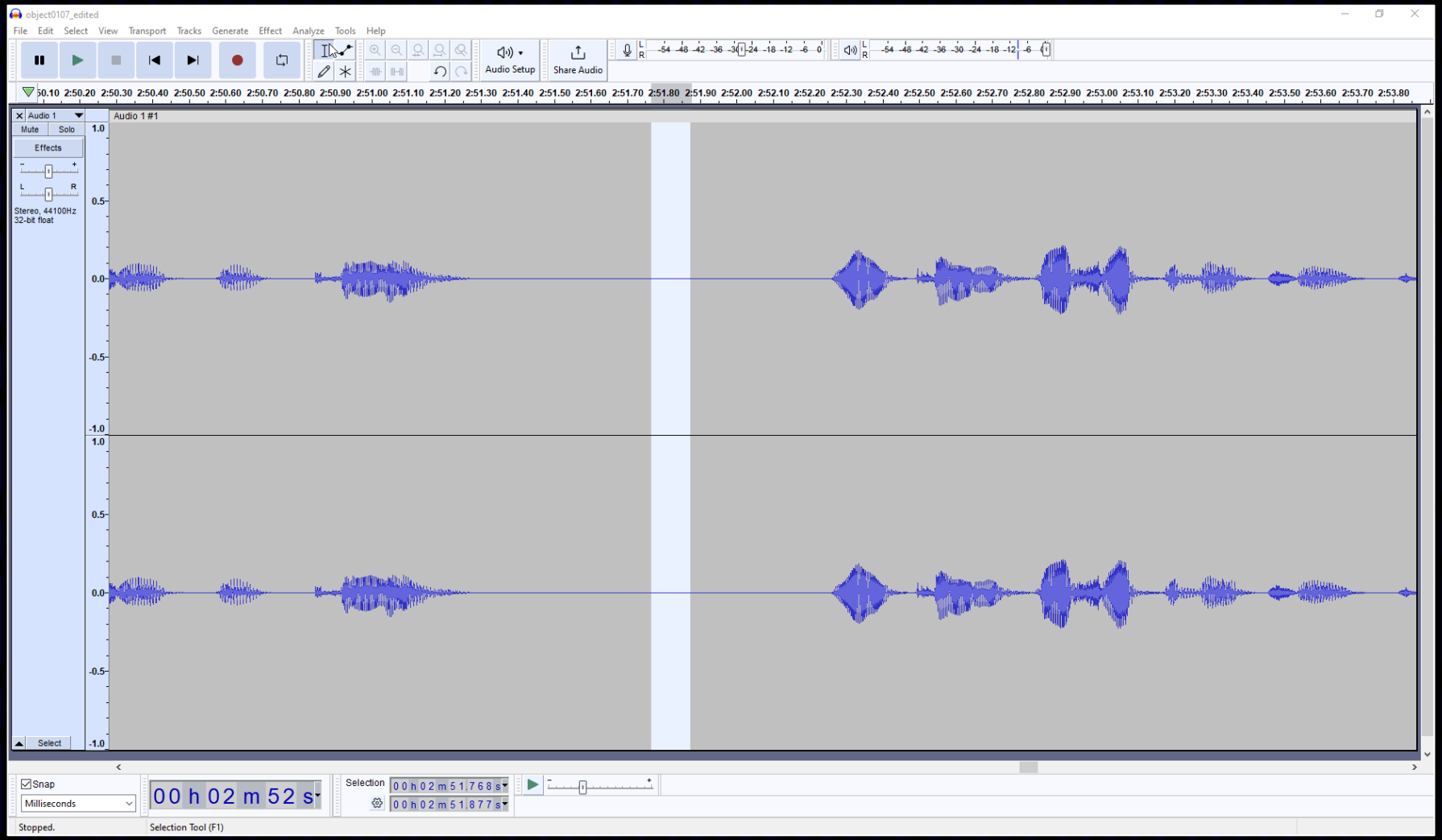
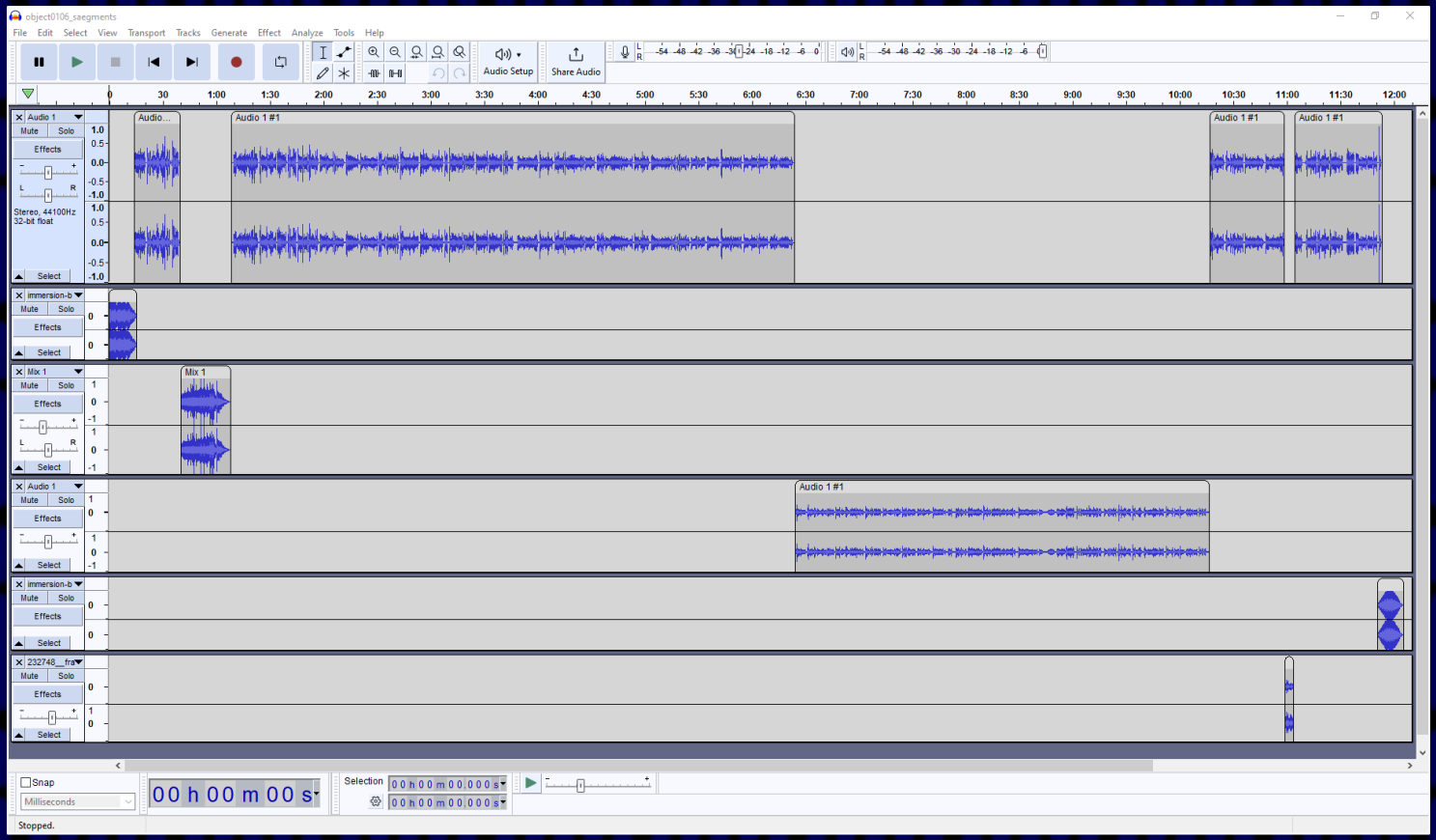
Snap
Milliseconds
00 h 00 m 37 s
Selection
00 h 00 m 36,930 s
00 h 00 m 37,897 s
Stopped.

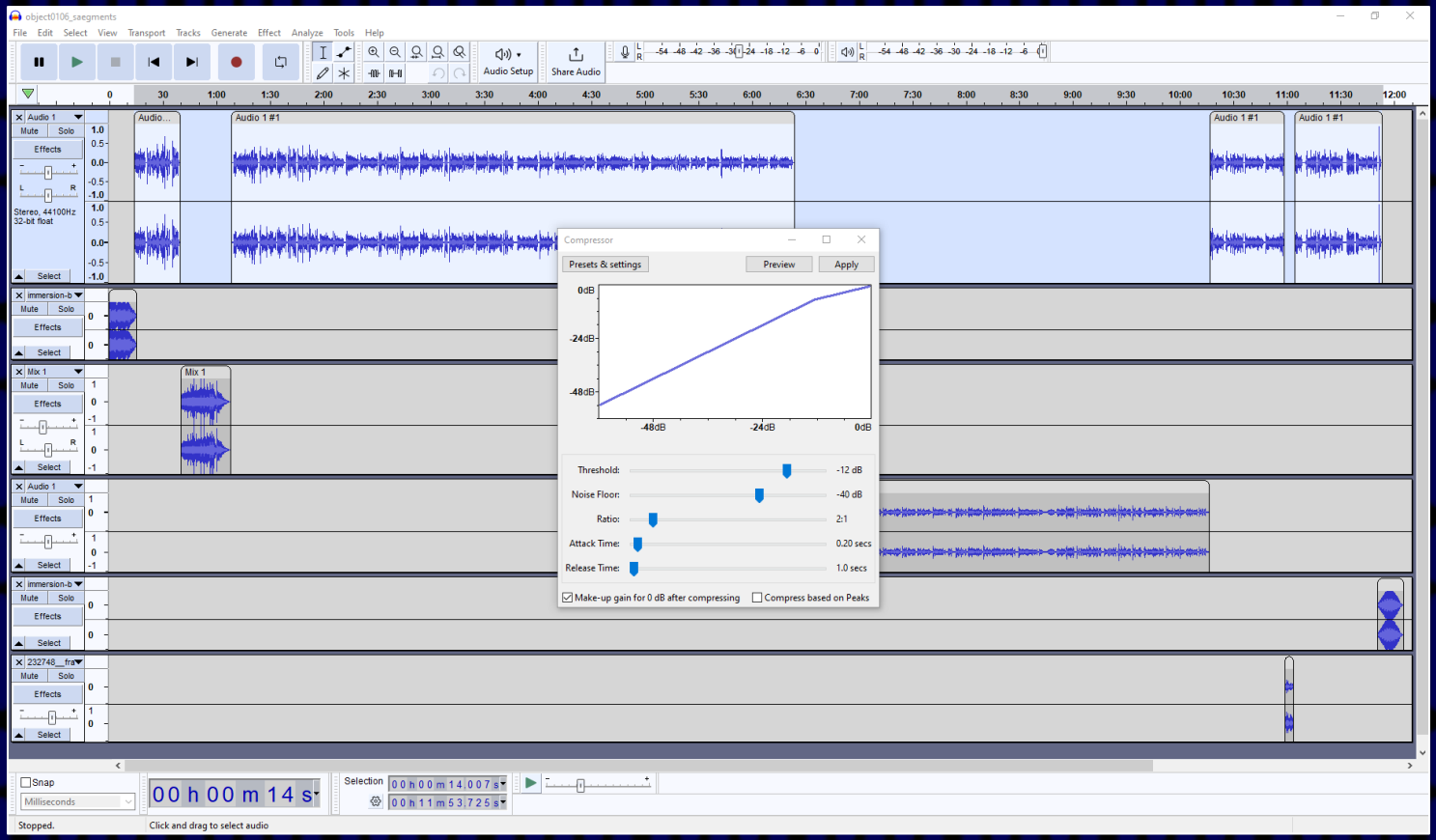

object0107_edited
File Edit Select View Transport Tracks Generate Effect Analyze Tools Help
Audio Setup
Share Audio
Audio 1
Mute Solo
Effects
Stereo, 44100Hz
32-bit float
Audio 1 #1
Select
Snap
Milliseconds
00 h 02 m 52 s
Selection
00 h 02 m 51.768 s
00 h 02 m 51.768 s
Stopped.


object0107_edited
File Edit Select View Transport Tracks Generate Effect Analyze Tools Help
Audio Setup
Share Audio
Audio 1
Mute Solo
Effects
Stereo, 44100Hz
32-bit float
Audio 1 #1
Select
Snap
Milliseconds
00 h 02 m 52 s
Selection
00 h 02 m 51.768 s
00 h 02 m 51.877 s
Stopped.
Selection Tool (F1)

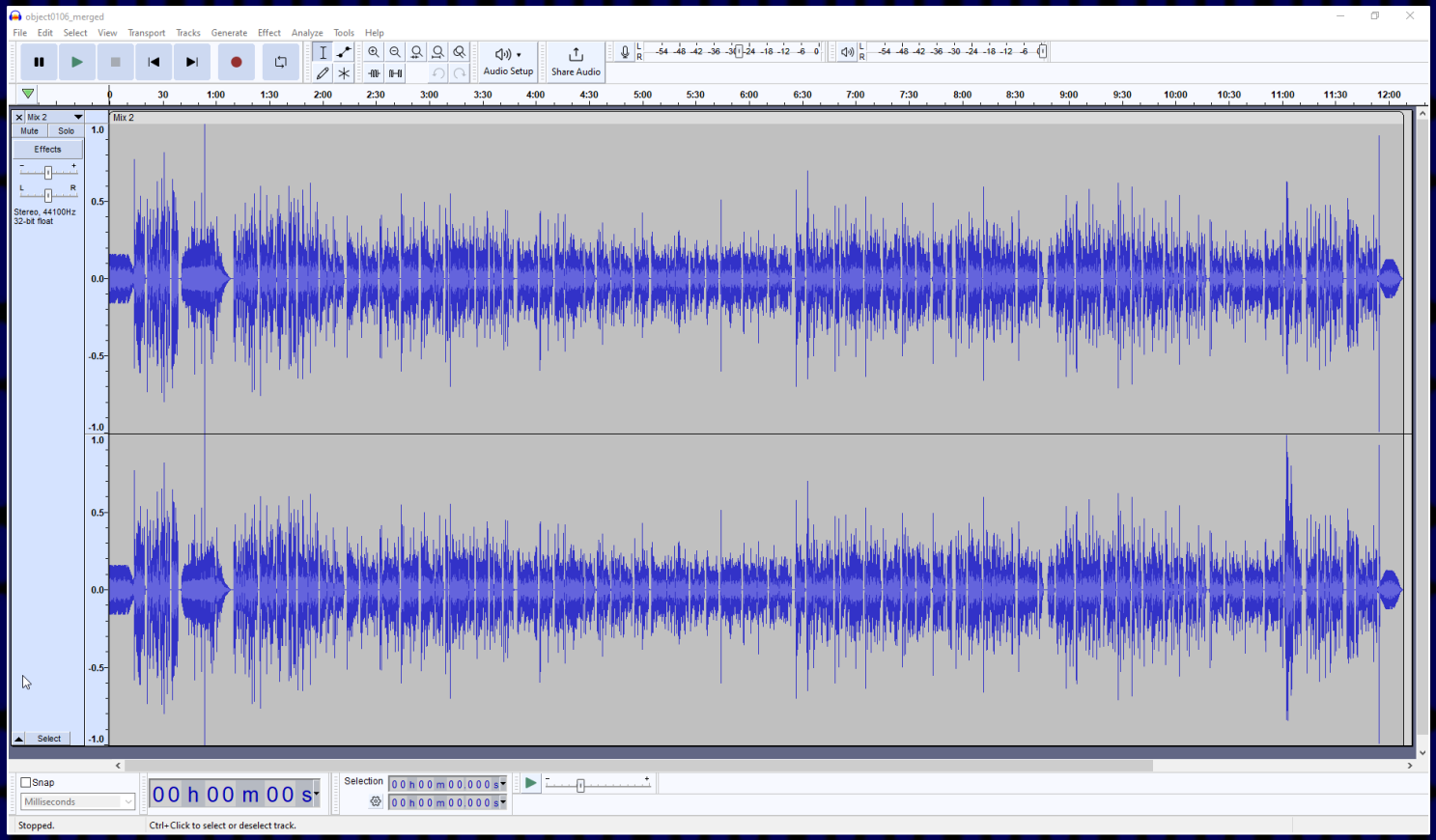
After the recorded audio is complete, I then add the music and sound effects as separate tracks. Next, I adjust the amplitudes of those tracks to match the amplitude of the vocal track.



After this, I apply dynamic compression to the vocals so that the volume throughout the vocals is consistent.

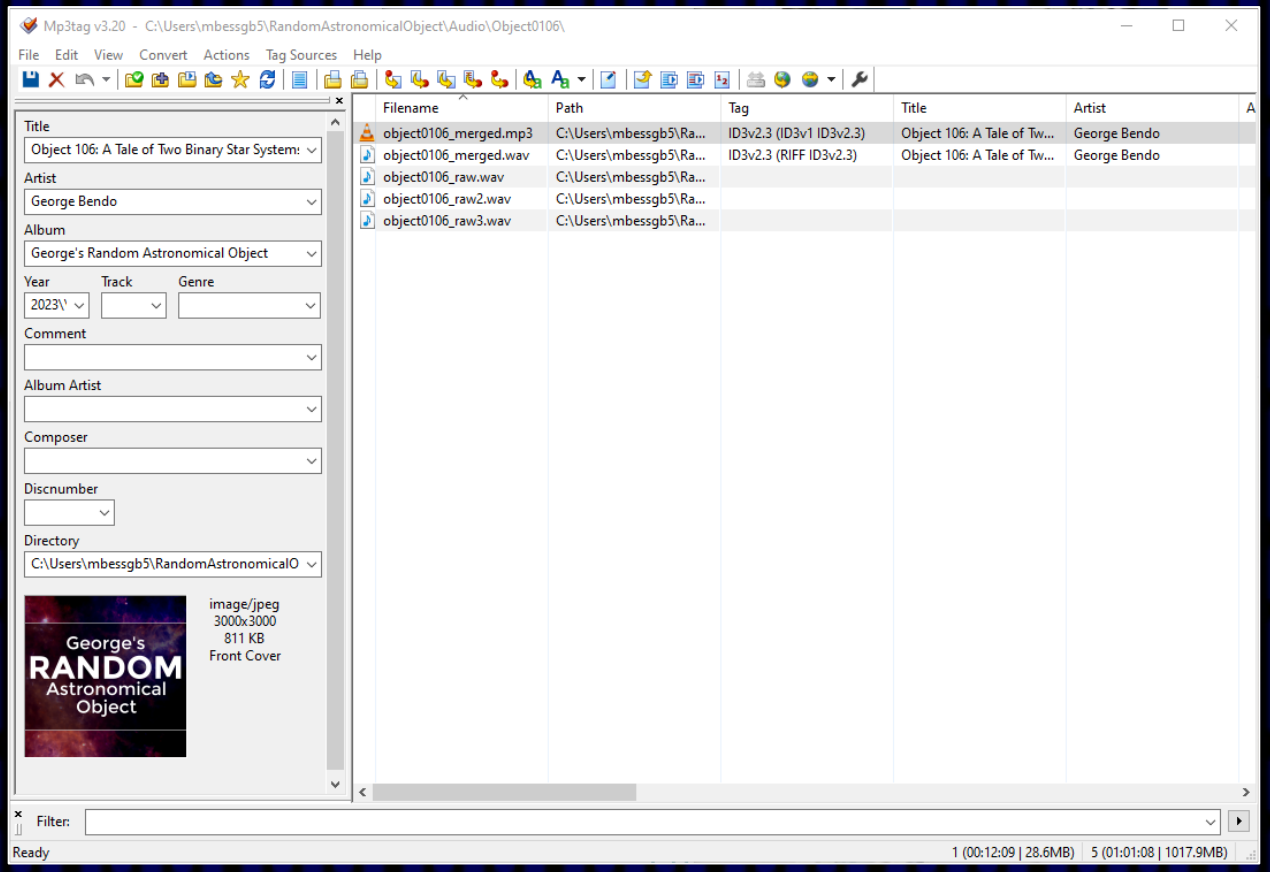


Next, I merge the tracks. I then listen to the audio again and make final adjustments to the audio.



The final podcast is exported as an mp3 where I add information on the podcast name, the episode name, the creator name, and some additional information. I also save another copy as a wav file (since wav files are lossless and mp3 are not).

I then use mp3tag to add album art to the mp3 file. At this point, the file is ready for distribution.



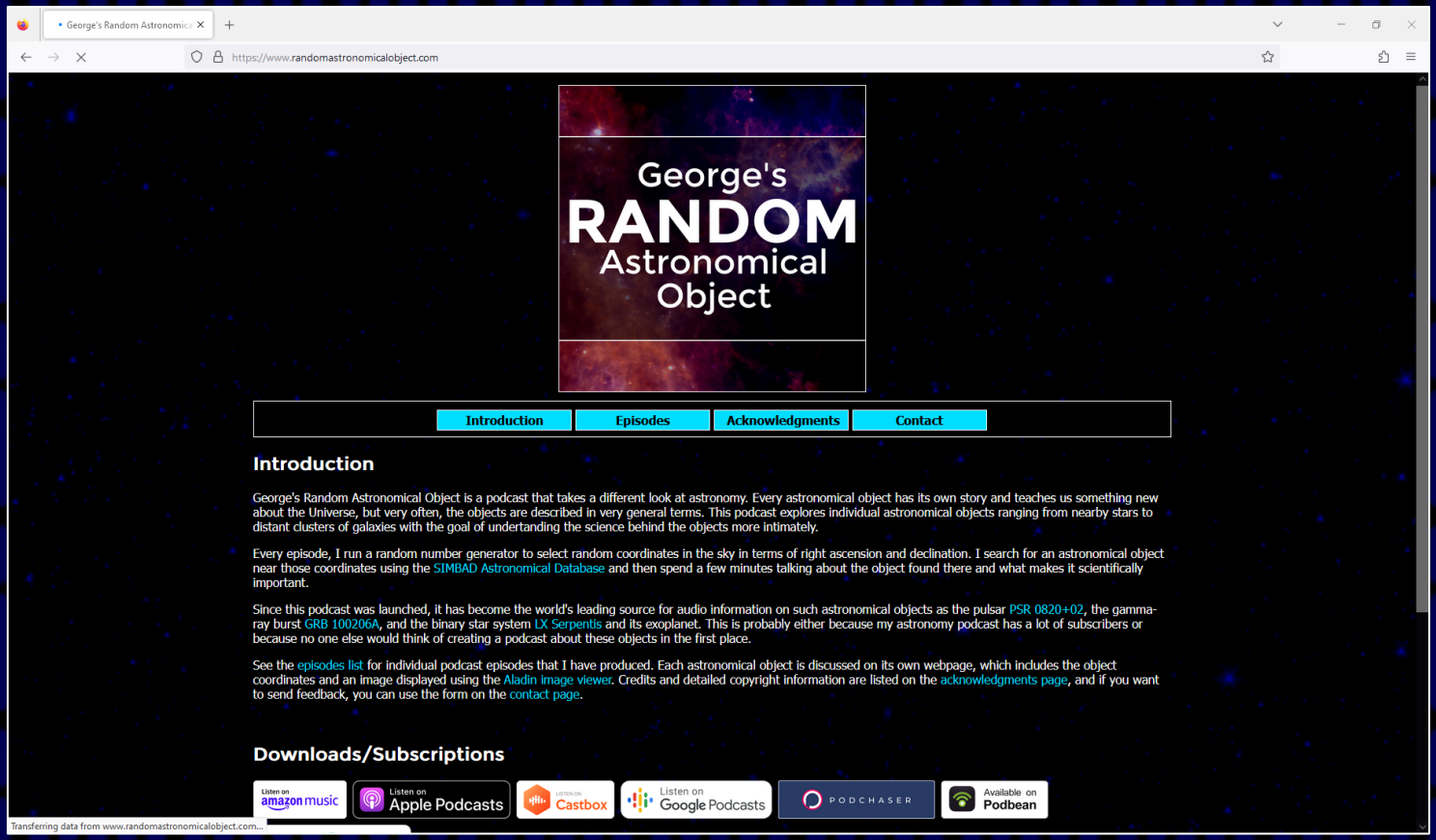
Website

All podcasts need to be placed somewhere on the web. Two general options are available:

- Create your own website and place it on a hosting platform.
- Place the podcast on a specialist podcast hosting platform.

You want your webpages to include at least the following:

- Episode list
- Transcripts for each episode
- Links to distribution websites (Spotify, Apple Podcasts, etc.)



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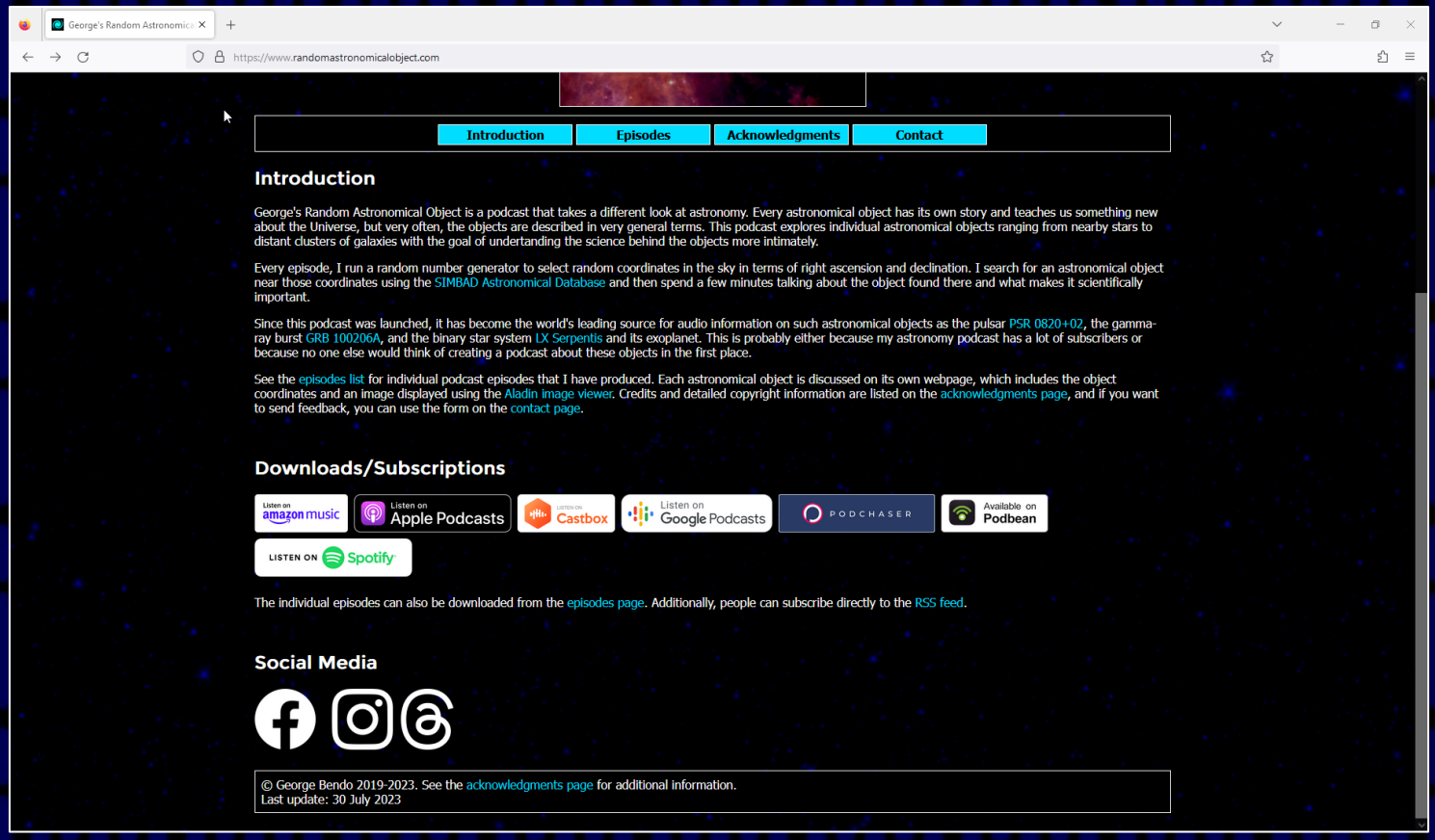

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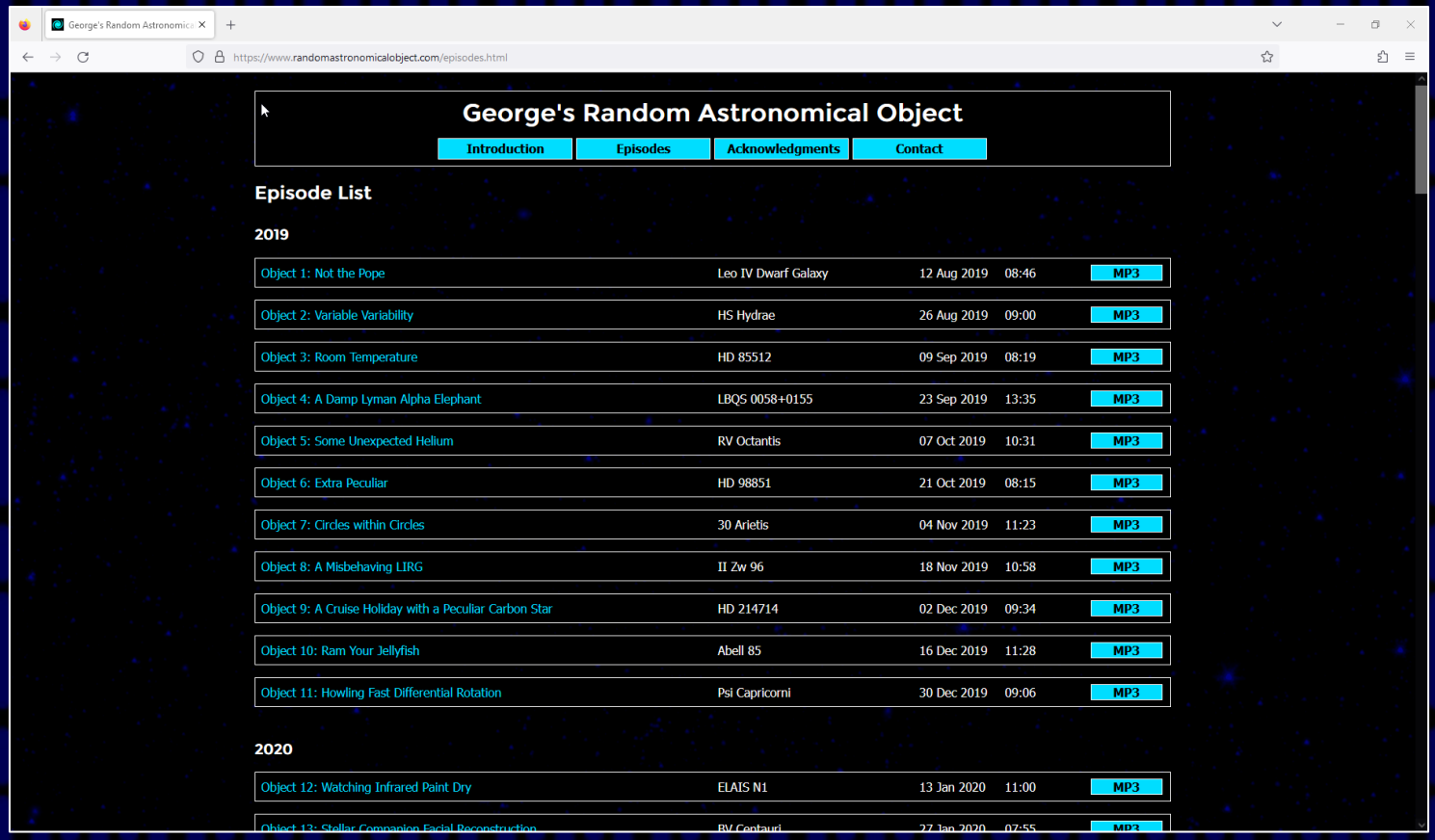

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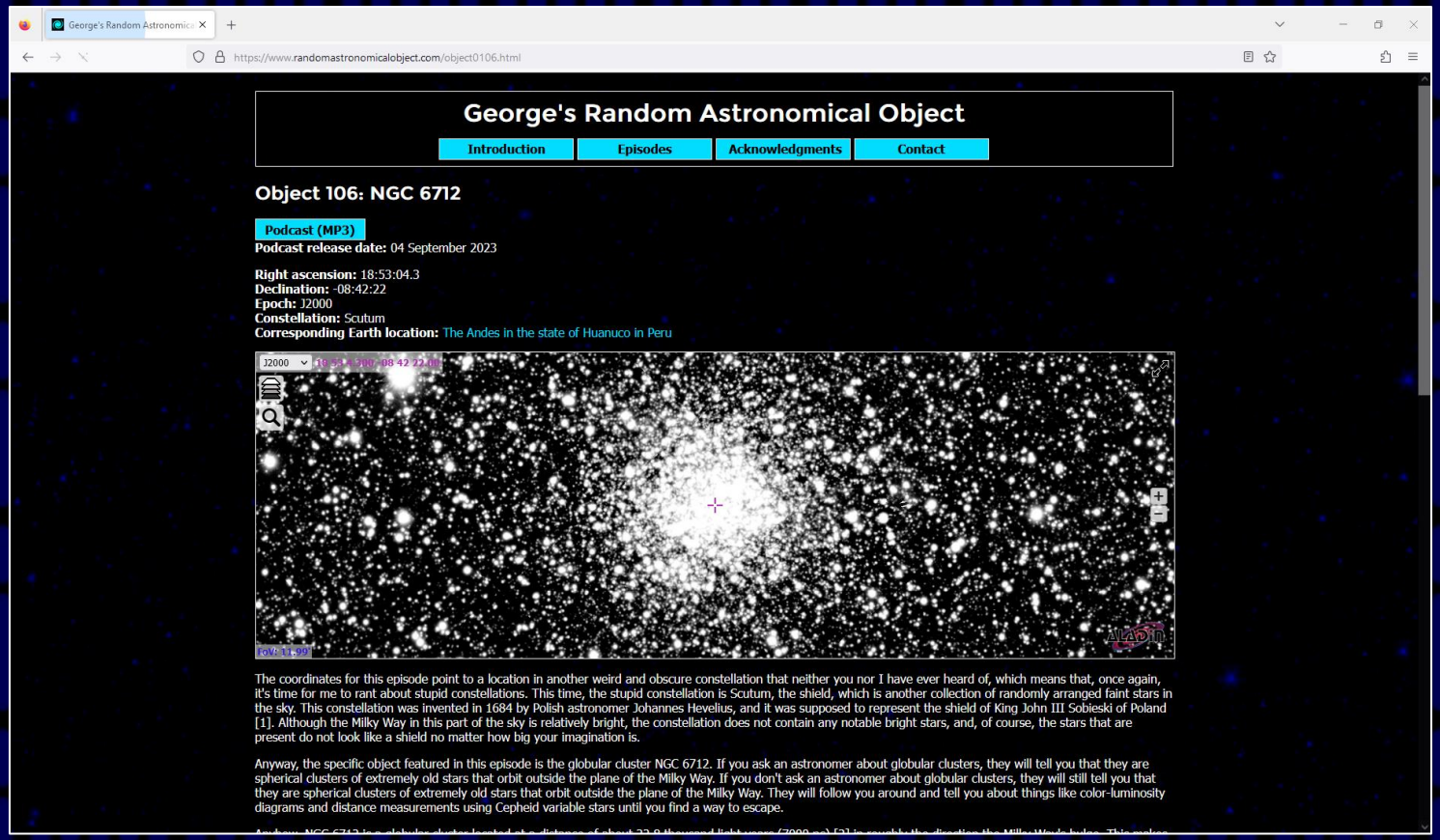

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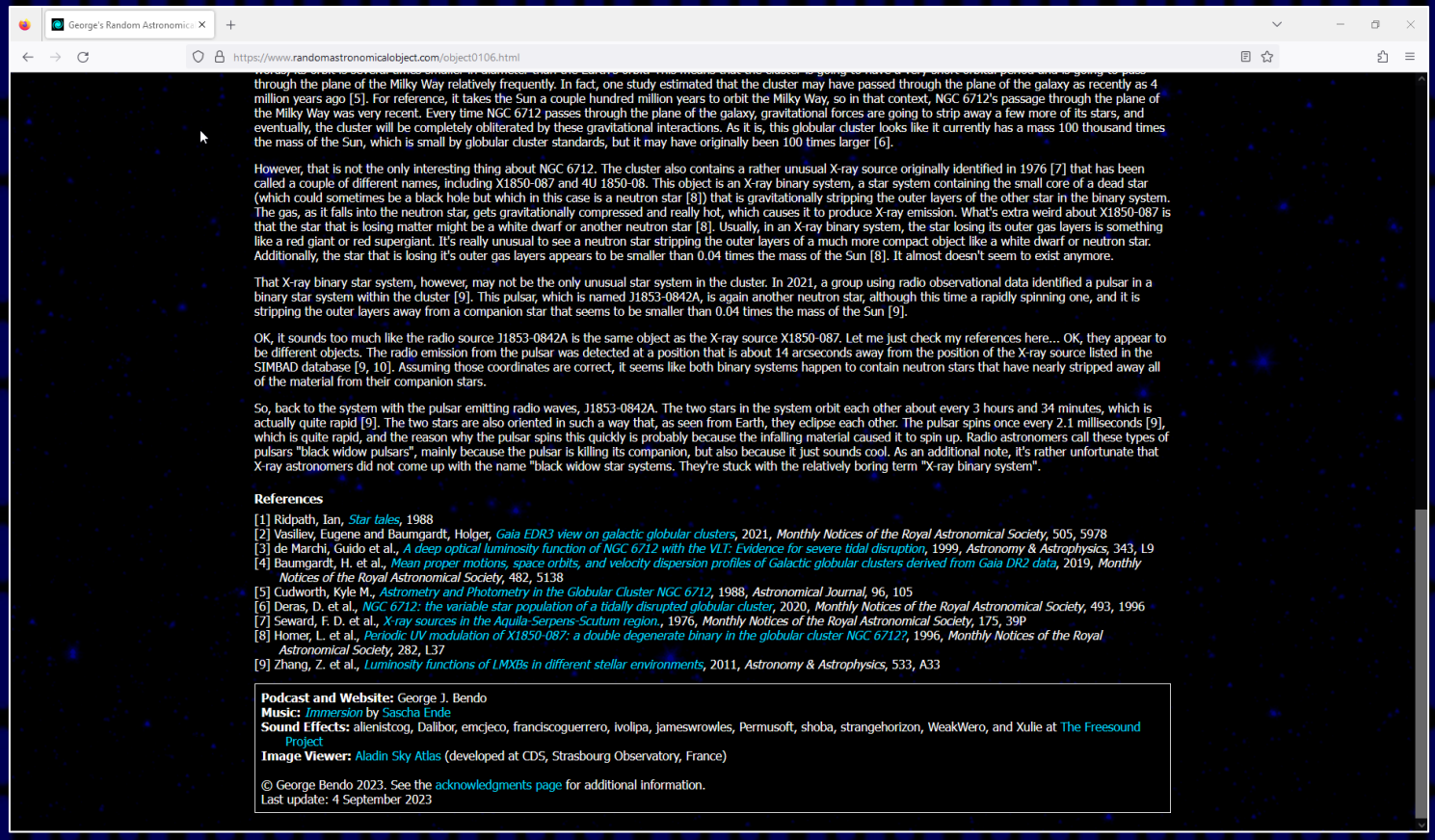

The webpages could also include other pages, such as biographies and information not put into the podcasts themselves (especially images and references).

Very importantly, the mp3 files themselves should be placed on the website.

Also, very importantly, the podcast needs an RSS feed. This is a special type of xml file with information about the podcast that is read by podcast distribution websites (Spotify, Apple Podcasts, etc.).

The top part of the RSS file (which could be named rss.xml for simplicity) should have an rss tag (specifying the type of RSS feed) and a channel tag that should contain the following tags:

- title – Podcast title.
- link – Link to the podcast.
- image – Image for the podcast.
- itunes:image – Image for the podcast.
- copyright – Copyright statement.
- description – General description of the podcast.
- itunes:subtitle – Short general description of the podcast.
- itunes:summary – General description of the podcast.
- itunes:owner – Podcast creator.
- language – Language of the podcast.

The top part of the RSS file (which could be named rss.xml for simplicity) should have an rss tag (specifying the type of RSS feed) and a channel tag that should contain the following tags:

- pubDate – Last date when the podcast was published.
- lastBuildDate – Last date when the RSS file was created.
- itunes:explicit – Boolean (True/False) to indicate whether the podcast contains explicit content.
- itunes:category – Subject category.
- itunes:keywords – Keywords that describe the podcast.
- itunes:type – Indicator for how the episodes should be listed (episodic/serial).
- atom – Tag for Atom web standard.

<rss xmlns:itunes="http://www.itunes.com/dtds/podcast-1.0.dtd" xmlns:podcast="https://podcastindex.org/namespace/1.0" xmlns:atom="http://www.w3.org/2005/Atom" xmlns:content="http://purl.org/rss/1.0/modules/content/" version="2.0">
  <channel>
    <title>George's Random Astronomical Object</title>
    <link>https://www.randomastronomicalobject.com/</link>
    <image>
      <url>https://www.randomastronomicalobject.com/podcast-icon.jpg</url>
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      <link>https://www.randomastronomicalobject.com/</link>
    </image>
    <copyright>George Bendo copyright 2019-2023</copyright>
    <description>George's Random Astronomical Object is a biweekly astronomy podcast featuring science discussions about astronomical objects at randomly selected locations in the sky. The wide range of topics discussed in the show include stars, variable stars, variable variable stars, supermassive black holes, ultracool dwarf stars, exoplanets, howler monkeys, infrared radiation, acronyms, more acronyms, starbursts, measurements of less than 20 parsecs, jellyfish galaxies, diffuse ionized gas, and general overall weirdness.</description>
    <language>en</language>
    <pubDate>04 Sep 2023 09:56:07 GMT</pubDate>
    <lastBuildDate>04 Sep 2023 09:56:07 GMT</lastBuildDate>
    <itunes:subtitle>George's Random Astronomical Object is a biweekly astronomy podcast featuring science discussions about astronomical objects at randomly selected locations in the sky. </itunes:subtitle>
    <itunes:author>George Bendo</itunes:author>

```
    <itunes:summary>George's Random Astronomical Object is a biweekly astronomy
podcast featuring science discussions about astronomical objects at randomly selected
locations in the sky. The wide range of topics discussed in the show include stars,
variable stars, variable variable stars, supermassive black holes, ultracool dwarf
stars, exoplanets, howler monkeys, infrared radiation, acronyms, more acronyms,
starbursts, measurements of less than 20 parsecs, jellyfish galaxies, diffuse ionized
gas, and general overall weirdness.</itunes:summary>
    <itunes:owner>
      <itunes:name>George Bendo</itunes:name>
      <itunes:email>rss-contact@randomastronomicalobject.com</itunes:email>
    </itunes:owner>
    <itunes:explicit>False</itunes:explicit>
    <itunes:image href="https://www.randomastronomicalobject.com/podcast-icon.jpg"/>
    <itunes:category text="Science">
      <itunes:category text="Astronomy"/>
      <itunes:category text="Natural Sciences"/>
    </itunes:category>
    <itunes:type>episodic</itunes:type>
    <itunes:keywords>astronomy,space,science,random</itunes:keywords>
    <atom10:link xmlns:atom10="http://www.w3.org/2005/Atom" rel="self"
href="https://www.randomastronomicalobject.com/rss.xml" type="application/rss+xml"/>
```

Each episode in the podcast will have its own entry in the RSS file. Those entries should include the following tags:

- title – Episode title
- itunes:title – Episode title
- itunes:subtitle – Episode subtitle
- itunes:author – Episode creator
- description – Short description of the episode.
- itunes:summary – Short description of the episode.
- enclosure – Link to the mp3 file.
- guid – Identifier for the episode.
- link – Link to a webpage for the episode.
- pubDate – Publication date.
- itunes:duration – Episode length.
- itunes:explicit – Boolean (True/False) to indicate whether the episode contains explicit content

The end of the episode list should include </channel> and </rss>.

```
    <item>
      <title>Object 106: A Tale of Two Binary Star Systems</title>
      <itunes:title>A Tale of Two Binary Star Systems</itunes:title>
      <itunes:author>George Bendo</itunes:author>
      <description>While some astronomers are interested the globular cluster NGC
6712 because it appears to have been severely tidally disrupted by orbiting too close
to the center of the Milky Way, other astronomers are interested in the cluster
because it contains a couple of weird yet similar binary star systems.</description>
      <itunes:subtitle>NGC 6712</itunes:subtitle>
      <itunes:summary>While some astronomers are interested the globular cluster NGC
6712 because it appears to have been severely tidally disrupted by orbiting too close
to the center of the Milky Way, other astronomers are interested in the cluster
because it contains a couple of weird yet similar binary star
systems.</itunes:summary>

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length="29294000"/>
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      <link>https://www.randomastronomicalobject.com/object0106.html</link>
      <pubDate>04 Sep 2023 12:00:00 GMT</pubDate>
      <itunes:duration>12:09</itunes:duration>
      <itunes:explicit>false</itunes:explicit>
    </item>
```

The RSS file itself can be validated using one or more of the following websites:

- Cast Feed Validator (www.castfeedvalidator.com)
- Podbase – Podcast Validator (podba.se/validate/)
- W3C Feed Validation Service (validator.w3.org/feed/)

See also https://www.randomastronomicalobject.com/rss.xml for an example RSS feed.

Distribution

Once the podcast has been set up, it needs to be distributed to the websites and apps where people listen to podcasts (although some people may want to just listen to episodes from your website).

The largest podcast distributors at this point in time are:

- Amazon Music
- Apple Podcasts
- Google Podcasts
- Simplecast
- Spotify
- YouTube

However, many other podcast distribution apps/websites exist:

- AntennaPod
- Anytime Player
- Bullhorn
- Castamatic
- Castbox
- Castro
- Curiocaster
- Fountain
- Goodpods
- Luminary
- Moon FM
- Overcast
- Player FM
- Pocket Casts
- Podbean
- Podcast Addict
- Podcast Index
- Podcast Guru
- Podcast Republic
- Podchaser
- Podfriends
- podStation
- Podverse
- Podvine
- Sonnet
- Steno.fm
- TuneIn
- Vurbl

To distribute a new podcast, you need the RSS feed set up and at least one episode online. At this point, you should go to at least the podcast distribution websites below and submit your RSS feed:

- Amazon Music
- Apple Podcasts
- Simplecast
- Spotify

(These distributors will distribute podcasts for free.)

After a few days, the podcast should be approved and should appear in these apps/websites.

After a few more days, other apps may copy the podcast listings from one of the larger distribution apps/websites and will list your podcast.

Google Podcasts specifically uses a webcrawler that will find your podcast and automatically list it.

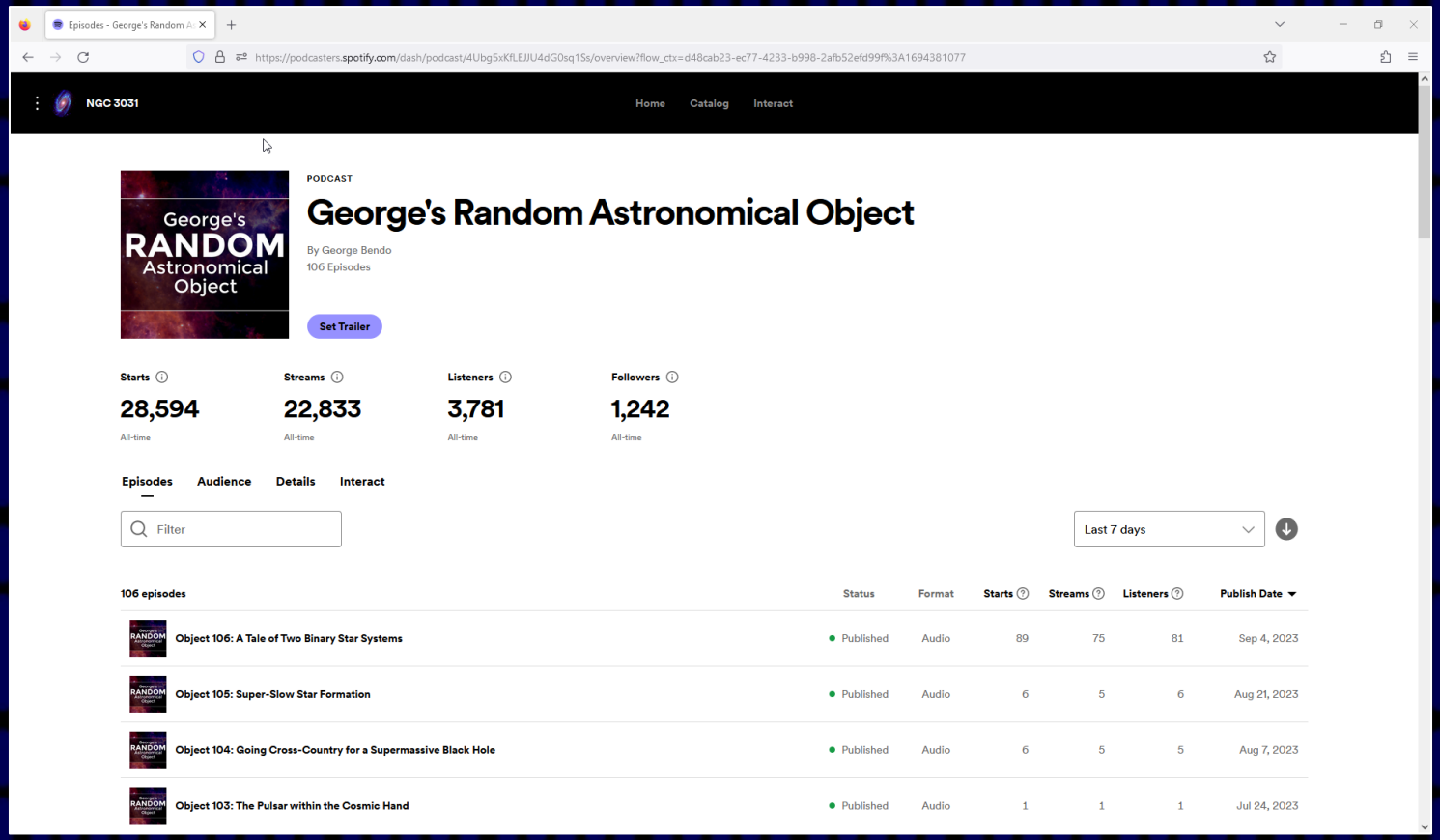
If you find other podcast websites that do not list your podcast, you can always try submitting it.

When you publish a new episode for your podcast, you only need to update the RSS file. The distribution apps and websites will automatically list the new episode (although it may take an hour or so).

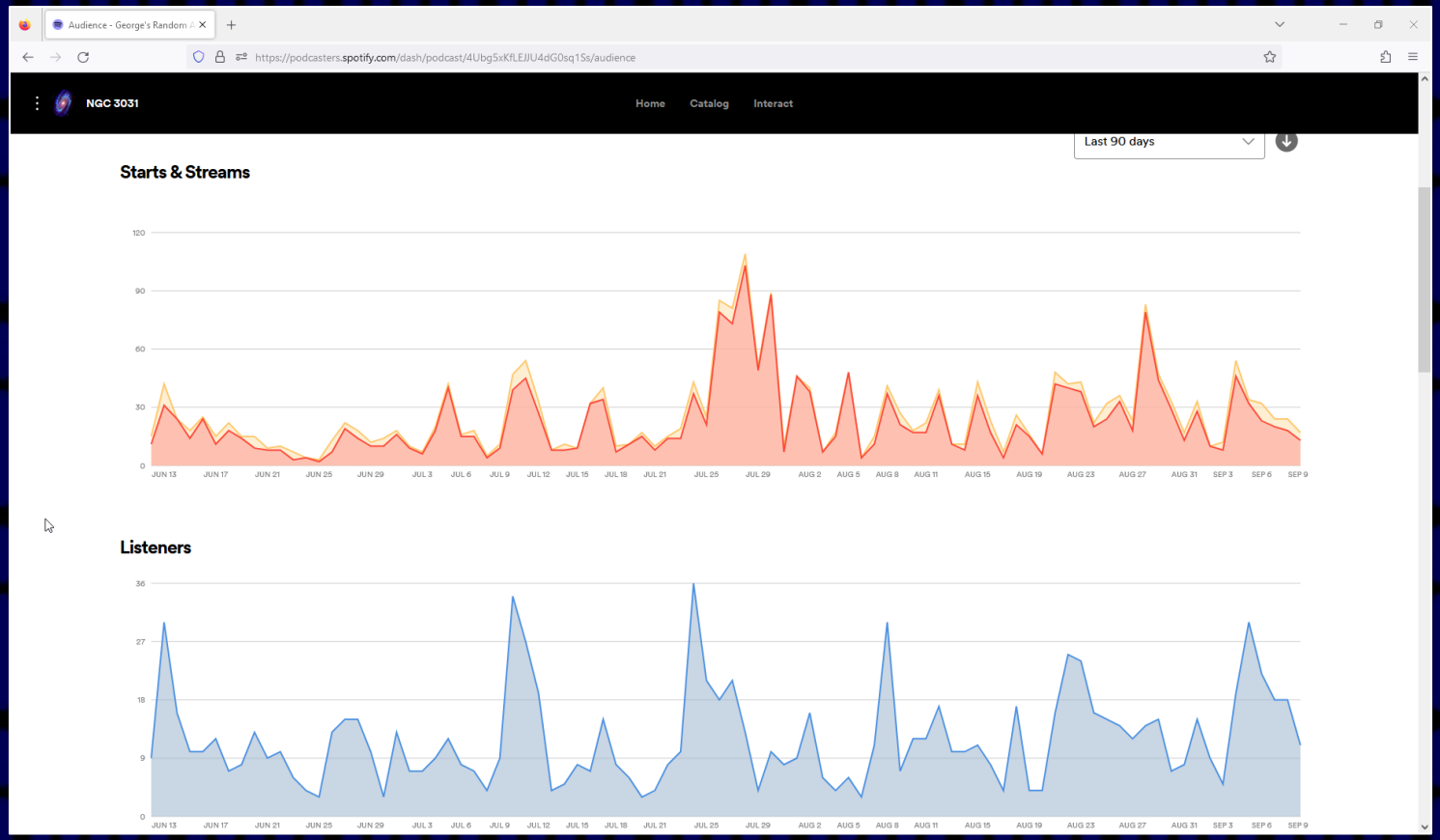
It is worthwhile to frequently check your podcast on various distribution websites, especially the major ones, just to make sure that the podcast and episodes are displayed properly.

(Some of the less popular websites may not function well and may show out-of-date information.)

Many distribution websites include analytical information that podcasters can use to see how their podcasts are performing. Spotify has very comprehensive information. Apple Podcasts and Google Podcasts also have good pages.



Many distribution websites include analytical information that podcasters can use to see how their podcasts are performing. Spotify has very comprehensive information. Apple Podcasts and Google Podcasts also have good pages.



Publicity

When starting a new podcast, it may have very listeners. This will change over time.

Eventually, people will find your podcast on their own and will begin listening to it. It is important to keep on producing episodes and to keep on publishing them on time.

However, it is possible to do a few things to improve the visibility of the podcast.

Word-of-mouth is always a useful way to spread information about your podcast, but this might be limited to people you know.

Paying for advertising could lead to a boost in listeners. However, this is not advisable if you have no money.

A couple of unique options for podcasts to get more publicity is to either feature guests (especially from other podcasts) or to do guest episodes on other podcasts.

365 Days of Astronomy is open to guest episodes from various contributors and would be a good place to advertise your new astronomy podcast.

Also, be certain to set up profiles for your podcast on social media (at least Facebook) and to direct people to those profile pages.