

Category/Purpose	File Format	Resolution	Notes
Long-term High Resolution Standard	- Linear PCM bit stream - Uncompressed .WAV or .AIFF	24 Bit @ 48 KHz (minimum) mono/dual mono/stereo interleaved	Higher resolutions are encouraged if technology and space are available
Deliverable “Hard Copy” Standard (Compact Disc)	- Linear PCM bit stream - Uncompressed .WAV or .AIFF	16 Bit @ 44.1 KHz Stereo Interleaved only	Derive from original “High-res” files using proper dithering and down-sampling
Deliverable Web-Based Standard (Downloadable)	- Mp3 (most universally accepted) - AAC (iTunes proprietary) - Real Audio (Real Audio Player Proprietary)	Minimum of 128 Kbps @ 44.1 KHz mono Or Minimum of 256 Kbps @ 44.1 KHz stereo	Try to avoid proprietary formats, as they can only be read in specific programs/players

Long Term Preservation Standard:

The initial recording/digitization for the source material should be done with the utmost care. Audio should also be recorded at no less than 24 bit @ 48 KHz. If higher sampling rates such as 96 KHz are available (as well as the subsequent hard drive space needed to stored the increased file sizes), then the higher resolution should be used. Software-based DAWs (Digital Audio Workstations) such as Pro Tools, Sound Forge, Nuendo, SONAR, etc. each are capable of recording high-resolution audio to a computer. Once in the computer, the audio can then be manipulated and restored via software algorithms called “plug-ins”. Each of these programs differs slightly in terms of user process, but essentially do the same thing.

There will be instances where audio may need to be restored*. This should only serve to return the current source audio back to its original sound quality. Any enhancements beyond that end are generally frowned upon as unethical, as they are subjective in nature. The operator of the technology being used should have some prior training in audio recording, editing, and processing (restoration).

*Recommended audio restoration software:

- Sonic NoNoise (latest version)
- Waves Restoration (latest version)

These programs are available online with regular updates forthcoming.

Deliverable Hard Copy Version:

This refers to a version of the audio file that can be burned onto Compact Disc to play in standard CD players. The specifications are quite rigid for an audio file to be usable on a CD. Any other properties will make the file ineligible for CD audio. The extension can be the same as the original high-res audio files (.WAV or .AIFF) But the bit-depth and sampling rate have to be precisely 16 bit @ 44.1 KHz: the resolution of all commercially available CD players. Most DAWs will allow the user to set the end result audio to what they need. For CD audio, it should be down-sampled to 44.1 KHz and dithered down to 16 bit. Simply jumping from 24 to 16 bits may result in slightly compromised sonic quality. The gaps of information must be smoothed out when going from 24 to 16 bits using dither.

For copyright and ownership purposes, written permission should be obtained before allowing users to gain access to these files.

Deliverable Web-Based Standard:

There are three forms of accepted web-based audio: mp3, AAC, and Real Audio. Of the three types, mp3 is the most universally accepted. AAC is a proprietary format used by Apple's iTunes program. As is Real Audio, being proprietary to only Real Audio Media Player. Virtually all such programs can access mp3s.

These audio files have undergone a process of data compression, which decreases the overall size of the files. This makes them much easier to download via the internet for reference and/or research purposes. However, the more data compression is applied, the less the sound quality is preserved or retained. A minimum of 128 Kbps @ 44.1 KHz for mono files and 256 Kbps @ 44.1 KHz for stereo is considered to be at the low end of maintaining sonic integrity. It should be noted that the higher the resolution, the more data is maintained, resulting in larger file sizes. In turn, this will result in longer downloading times. With the increased access to high-speed internet connections, this shouldn't be an issue. Only those wishing to access the system through a dial-up connection will see a significant difference in download times.

** It should be noted that these standards should be reviewed at regular two-year intervals, as the level of technology in digital audio advances quite rapidly.

References:

Digital Formats for Library of Congress Collections

http://www.digitalpreservation.gov/formats/fdd/sound_fdd.shtml

Quality and Functionality Factors For Sound (Audio): Library Of Congress

http://www.digitalpreservation.gov/formats/content/sound_quality.shtml

Columbia University Ethnomusicology Department

<http://www.music.columbia.edu/%7Ececenter/CenterSite/index.html>

Sound Directions: Project Documentation: Indiana University

<http://www.dlib.indiana.edu/projects/sounddirections/index.shtml>

<http://www.dlib.indiana.edu/projects/sounddirections/projectDoc/admin/grant.shtml#overview2>

International Association of Sound and Audiovisual Archives

<http://www.iasa-web.org/iasa0013.htm>