

N I N T E N D O
NITRO-System

Photoshop Plug-ins

Version 1.0.4

(11/28/2005 version)

**The contents in this document are highly
confidential and should be handled accordingly.**

Confidential

These coded instructions, statements, and computer programs contain proprietary information of Nintendo of America Inc. and/or Nintendo Company Ltd. and are protected by Federal copyright law. They may not be disclosed to third parties or copied or duplicated in any form, in whole or in part, without the prior written consent of Nintendo.

Table of Contents

1	Operating Environment	6
2	Plug-in Types	7
2.1	Maya Version.....	7
3	Filter Plug-Ins.....	8
3.1	Color Depth Filter Plug-in	8
3.1.1	Using the Filter	8
3.1.2	Cautions	9
3.1.2.1	Image Mode.....	9
3.2	The 4x4 Texel Compressed Texture Filter Plug-in	9
3.2.1	Using the Filter	9
3.2.2	Cautions	10
3.2.2.1	Image Mode.....	10
3.2.2.2	Alpha Channels.....	10
3.2.2.3	Layers	10
3.2.2.4	Refiltering.....	10
3.2.2.5	Running the Filter from Actions	11
4	File Format Plug-Ins	12
4.1	TGA Format Plug-in.....	12
4.1.1	Saving	12
4.1.1.1	Format Options	13
4.1.1.2	Palette Name Options.....	14
4.1.1.3	4x4 Texel Compressed Options	14
4.1.1.4	The Preview Function	14
4.1.2	Loading	15
4.1.3	Cautions	15
4.1.3.1	Image Mode.....	15
4.1.3.2	Transparent texels	15
4.1.3.3	Palette Data	17
4.1.3.4	Alpha Channels.....	17
4.1.3.5	Layers	18
4.1.3.6	Saving (overwrite).....	18
4.1.3.7	Maintaining Image Quality.....	18
4.2	PIC Format Plug-in	18
4.2.1	Saving	18
4.2.2	Loading	20
4.2.3	Cautions	20
5	4x4 Texel Compressed Textures: Cautions	21
5.1	When a 4x4 Texel Compressed Texture Filter has been Applied.....	21
5.2	When a 4x4 Texel Compressed Texture Filter has not been Applied.....	21

Tables

Table 2-1 Plug-in Types	7
Table 4-1 Format Selection Conditions.....	13

Figures

Figure 3-1 NNS_ColorDepth Dialog Box	8
Figure 3-2 NNS_4x4Compressed Dialog Box	9
Figure 3-3 NNS_4x4Compressed Refilter Warning Dialog Box.....	11
Figure 4-1 NNS_Tga Dialog Box	12
Figure 4-2 Transparent Color in the Color Table.....	16
Figure 4-3 Converting from RGB Color to Indexed Color	17

Revision History

Version	Revision Date	Description
1.0.4	11/28/2005	<ul style="list-style-type: none"> Added support for Adobe Photoshop CS2 (9.0) for Windows. Added cautions regarding Photoshop CS or later to "4.1.3.6 Saving (overwrite)." (p. 15)
	06/20/2005	<p>New features/changes</p> <ul style="list-style-type: none"> Added preview feature and data volume display to <code>NNS_Tga</code> and <code>NNS_Pic</code> (4.1.1, 4.1.1.4). <p>Bug fixes</p> <ul style="list-style-type: none"> If "Use Linear Interpolation" was off when creating a 4x4 texel compressed texture, the color became dark in some places. We fixed this problem. (When saved in 4x4 texel compressed texture format or when the 4x4 texel-compressed texture filter is used, the palette size may be larger than in previous versions.) (3.2.1, 4.1.1.3). <p>Edits in manual only/revisions</p> <ul style="list-style-type: none"> Revised 4.1.3.3 Palette Data. Revised 4.1.3.7 Maintaining Image Quality.
1.0.3	03/24/2005	<p>Additions/revisions to manual only</p> <ul style="list-style-type: none"> Revised 4.1.3.2 Transparent texels. Revised 4.1.3.3 Palette Data.
	02/28/2005	<ul style="list-style-type: none"> Changed the font in the dialog box of the Windows version plug-in.
	09-27-2004	<ul style="list-style-type: none"> Corrected the internal process when creating 4x4 texel compressed texture. (The palette data size for saving the data in 4x4 texel texture format or when executing the 4x4 texel compressed texture filter may be reduced compared to the previous versions.) Released the Macintosh version of the plugin. Added caution regarding the memory in the Macintosh version of the plugin in the manual. (p. 6)
1.0.2	07-26-04	<ul style="list-style-type: none"> Change: When saving a file as NNS Tga (<code>NNS_Pic</code>), if the file has never been saved as NNS Tga (<code>NNS_Pic</code>), the default texture palette name will now be blank. Described the restriction on texture palette names when using the Nintendo NITRO-System library. (Section 4.1.1.2)
1.0.1	6/28/2004	Internal revisions to reading and writing of additional information.
1.0.0	5/24/2004	Initial version.

1 Operating Environment

These plug-ins are for use with the Windows versions of Adobe Photoshop: 6.0.1, 7.0.1, CS (8.0.1), CS2 (9.0) and Macintosh versions of Adobe Photoshop: 6.0.1, 7.0.1, CS (8.0.1). Their behavior is not guaranteed in other versions.

Note that all of the images in this manual show this plug-in in the Windows version of Adobe Photoshop 6.0.1.

Cautions Regarding the Macintosh Version of the Plug-In

In Mac OS 9 or older versions, problems may arise when using this plug-in to display a vertically and horizontally large-sized image.

In such cases, increase the memory allocation available for Photoshop by using the following procedure:

1. If Photoshop was already running, quit the program.
2. From Finder, select a Photoshop executable file. (Do not use an alias.)
3. In the [File] menu, select [Get Info], then [Memory].
4. Set a large enough value for "Minimum Size." The recommended value is 100,000 KB (100 MB).

2 Plug-in Types

2.1 Maya Version

The following plug-in types are included.

Table 2-1 Plug-in Types

Plug-in Type	Plug-in Name	Description
Filter Plug-ins	NNS_ColorDepth	Color depth filter plug-in This filter shows what the color depth will look like when the image is displayed on the retail product.
	NNS_4x4Compressed	Texel 4x4 compressed texture filter plug-in This filter shows what the image will look like when it is displayed on the retail product as a 4x4 texel compressed texture.
File Format Plug-ins	NNS_Tga	TGA Format Plug-in This saves and loads Targa (TGA) files that have additional Nintendo NITRO-System information.
	NNS_Pic	PIC format plug-in This saves and loads Softimage PIC files that have additional Nintendo NITRO-System information.

3 Filter Plug-Ins

3.1 Color Depth Filter Plug-in

Photoshop has a color depth of 8 bits (256 levels) each for R, G, B, and alpha. However, the retail product has a color depth of only 5 bits (32 levels) each for R, G, and B, and 1 bit (2 levels), 3 bits (8 levels), or 5 bits (32 levels) for alpha.

When you use this filter you will be able to see what the color depth will look like when the image is displayed on the retail product.

If you use this filter before you convert the Image Mode from RGB Color to Indexed Color, you can make it so that colors that become the same on the retail product are not registered multiple times in a color table.

3.1.1 Using the Filter

Select the channels that you want to filter, and select [Nintendo NITRO-System] → [NNS_ColorDepth...] on the [Filter] menu.

Filtering will occur instantly if you have not selected an alpha channel.

If you have selected an alpha channel, a dialog box for selecting alpha depth will appear.

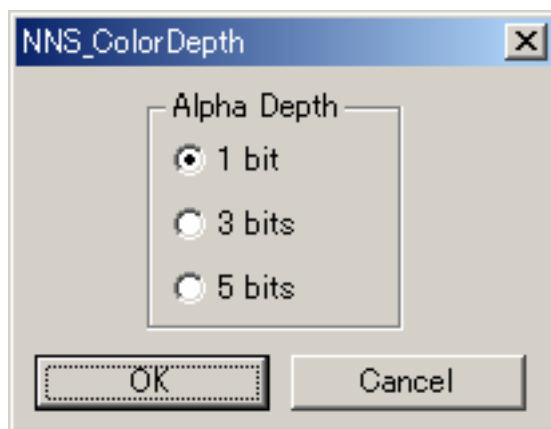


Figure 3-1 NNS_ColorDepth Dialog Box

Filtering will occur as soon as you select the alpha depth and click the [OK] button.

Color channel color depth is fixed at 5 bits.

3.1.2 Cautions

3.1.2.1 Image Mode

This can only be used if the Image Mode is Grayscale, Indexed Color, or RGB Color. In the case of Indexed Color, it is only used on the alpha channel.

It cannot be used on 16-bit-per-channel files.

3.2 The 4x4 Texel Compressed Texture Filter Plug-in

This filter shows what the image will look like when it is displayed on the retail product as a 4x4 texel compressed texture.

3.2.1 Using the Filter

The following dialog box will appear when you select all of the background channels and select [Nintendo NITRO-System] → [NNS_4x4Compressed...] on the [File] menu.

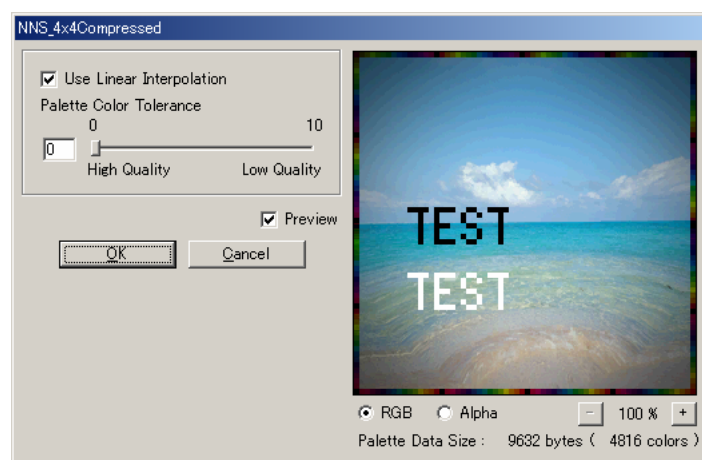


Figure 3-2 NNS_4x4Compressed Dialog Box

- **Use Linear Interpolation**

When linear interpolation is on there will be a maximum of 2 palettes for each 4x4 texel. When linear interpolation is off there will be a maximum of 4 palettes for each 4x4 texel.

Although generally image quality is better when linear interpolation is not used, palette data size will become larger than it would be if linear interpolation were used.

- **Palette Color Tolerance**

This specifies the color standardization range that is used for palette compression. Two colors will be deemed to be the same if each of their RGB channels (5 bits) differs by a value that does not exceed the value that is specified here.

The size of the palette data decreases as this value increases. However, image quality also decreases.

- **Preview**

A preview image and the palette data size are displayed if this is selected. Palette data size is always a multiple of 16 bytes.

If an alpha channel is present, the radio button switches between displaying the RGB channels and the alpha channel.

You can change the scale factor of the preview image with the + button, the - button and the mouse wheel.

(With the Macintosh version of the plug-in, the mouse wheel is enabled only in Mac OS X.)

Filtering will occur when you click the [OK] button.

If an alpha channel is present, texels for which the 8-bit alpha value is less than 128 will become transparent. Transparent areas will become black.

3.2.2 Cautions

3.2.2.1 Image Mode

This can only be used if the Image Mode is Grayscale or RGB Color.

It cannot be used on 16-bit-per-channel files.

3.2.2.2 Alpha Channels

If an alpha channel is present, use Shift + Left-click or the like to run the filter with all channels selected.

You cannot run the filter if more than one alpha channel is present.

3.2.2.3 Layers

This will not work on any layers other than the background.

3.2.2.4 Refiltering

If you have not made any changes to the image since you last filtered, a warning dialog box will appear.

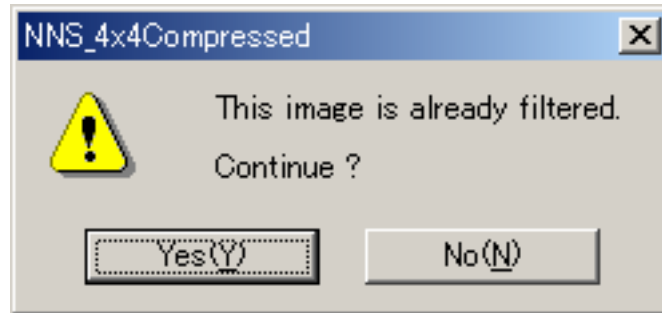


Figure 3-3 NNS_4x4Compressed Refilter Warning Dialog Box

To continue, click the [Yes] button. To stop, click the [No] button.

Notice that if the Palette Color Tolerance value is not 0, there is a possibility that the image will change each time you filter.

3.2.2.5 Running the Filter from Actions

In the case that you run the filter from Actions, if `NNS_4x4Compressed` has been applied before, it will run with the options that were used the previous time.

If you have previously saved an `NNS_Tga` (`NNS_Pic`) format file in 4x4 Texel Compressed format, it will be saved using the options that were used then.

In all other cases, it will run using the options that are registered in Actions.

4 File Format Plug-Ins

4.1 TGA Format Plug-in

This plug-in saves and loads Targa (TGA) files that contain additional Nintendo NITRO-System information. This additional information includes the texture format, the palette name, texel data, palette data, etc. When intermediate files are output from 3D CG tools, this information will be reflected in the intermediate files.

4.1.1 Saving

To save a TGA file that contains additional Nintendo NITRO-System information, select “Save As” in the “File” menu and select the file format `NNS_Tga`.

When you click the [Save] button, the following dialog box opens:

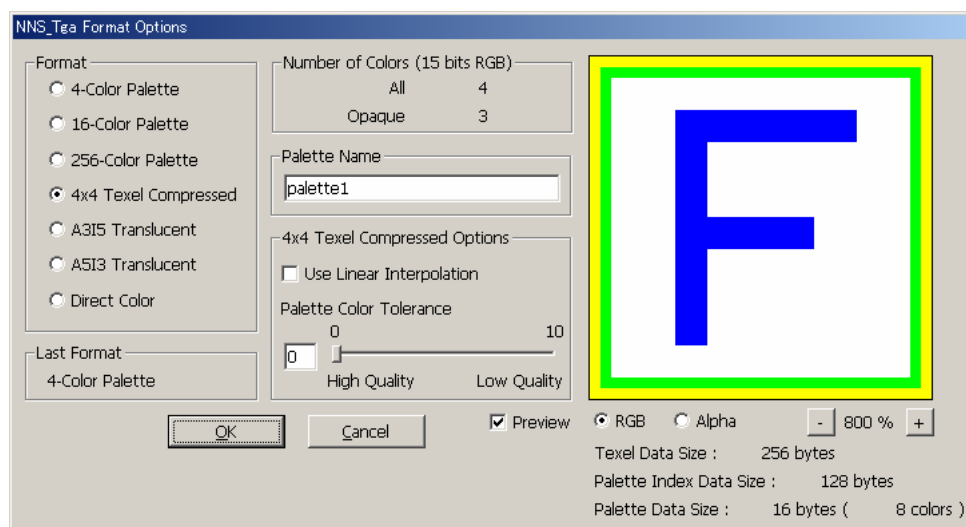


Figure 4-1 NNS_Tga Dialog Box

[Number of Colors (15-bit RGB)] shows the number of colors that are used in an image.

For any Image Mode other than Indexed Color, this displays the number of colors, given a color depth of 5 bits each of R, G, and B. “All” indicates the total number of colors used in the image. [Opaque] indicates the number of colors used by opaque texels (8-bit alpha value 128 or higher).

When the Image Mode is Indexed Color, this displays the number of colors in the color table (unused colors are also counted). If a transparent color is present in the color table, the number of [Opaque] colors will be one less than the number of [All] colors.

[Last Format] indicates the most recent format that was used when a file was saved as `NNS_Tga`.

To save, select the appropriate buttons and click the OK button.

4.1.1.1 Format Options

These specify the retail product's texture format.

The default selection will be consistent with the condition of the file.

However, in the case of a file that has been saved previously as NNS_Tga, the last saved format will be selected if it is possible to save in that format.

Also, in the case that a 4x4 texel compressed texture filter is currently applied, 4x4 Texel Compressed will always be selected.

The following table illustrates the conditions under which each format can be selected.

Table 4-1 Format Selection Conditions

Are There Any Transparent Texels?	Format Name	Conditions That Allow Selection
There are no transparent texels. (There are no transparent colors in the color table)	4-Color Palette	Number of Colors, "All" is 4 or less.
	16-Color Palette	Number of Colors, "All" is 16 or less.
	256-Color Palette	Number of Colors, "All" is 256 or less. ¹
	4x4 Texel Compressed	Can always select.
	A3I5 Translucent	Number of Colors, "All" is 32 or less. ¹
	A5I3 Translucent	Number of Colors, "All" is 8 or less. ¹
	Direct Color	Both image width and height are 512 or less, or either image width or height is 256 or less.
There are transparent texels. (There is a transparent color in the color table.)	4-Color Palette	Number of Colors, Opaque is 3 or less.
	16-Color Palette	Number of Colors, Opaque is 15 or less.
	256-Color Palette	Number of Colors, Opaque is 255 or less. ¹
	4x4 Texel Compressed	Can always select.
	A3I5 Translucent	Number of Colors, "All" is 32 or less. ¹
	A5I3 Translucent	Number of Colors, "All" is 8 or less. ¹
	Direct Color	Both image width and height are 512 or less, or either image width or height is 256 or less.

¹ These cannot be selected if both the image width and height exceed 513.

4.1.1.2 Palette Name Options

This specifies the texture palette name. You may not use full-width characters, half-width kana characters, or double quote marks (").

The intermediate file output plug-ins for 3D CG tools use the texture palette name to determine whether a palette is common. If you want textures to share a palette, specify the same texture palette name.

If the texture palette name is blank, the intermediate file output plug-in will automatically determine the texture palette name from the texture file name.

NOTE: If you intend to use the Nintendo NITRO-System Library, texture palette names must not exceed 16 characters in size (including non-alphanumeric characters).

4.1.1.3 4x4 Texel Compressed Options

These specify options related to the method used for compressing 4x4 texel compressed textures.

Note: Unless further alterations are made to an image after a 4x4 texel compressed texture filter has been applied, **you will not be able to change the options.**

- **Use Linear Interpolation**

When linear interpolation is on, there will be a maximum of 2 palettes for each 4x4 texel. When linear interpolation is off, there will be a maximum of 4 palettes for each 4x4 texel.

Although generally image quality is better when linear interpolation is not used, the amount of palette data will become larger than it would be if linear interpolation were used.

- **Palette Color Tolerance**

This specifies the color standardization range that is used for palette compression. Two colors will be deemed to be the same if each of their RGB channels (5 bits) differs by a value that does not exceed the value that is specified here.

The size of the palette data decreases as this value increases. However, image quality also decreases.

4.1.1.4 The Preview Function

When **Preview** in the dialog box is set to ON, the preview image and the data size (texel data size, palette index data size and palette data size) will be displayed. The preview image allows you to view textures saved with the current options as they would appear on the retail product. Even after saving, the image quality in Photoshop will not change.

The palette index data size is displayed when the format is 4x4 Texel Compressed.

The palette data size is displayed when the format is not Direct Color. The 4-Color Palette data size is fixed at 8 bytes and in all other formats, the size is a multiple of 16 bytes.

Use the radio buttons to switch between RGB display and alpha display. The alpha display reflects transparent colors in the alpha channel or color table.

You can use the [+] and [-] buttons, or the mouse wheel, to change the preview image's magnification. (In the Macintosh version of the plug-in, the mouse wheel is only valid with Mac OS X.)

4.1.2 Loading

To load a TGA file that has additional Nintendo NITRO-System information, select [Open] on the [File] menu, select the file, and click the Open button.

In the Windows version of Photoshop, you can also load by dragging and dropping a TGA file into the Photoshop window.

4.1.3 Cautions

4.1.3.1 Image Mode

You can only save files in `NNS_Tga` format if their Image Mode is Grayscale, Indexed Color, or RGB Color. You cannot save 16-bit-per-channel files in `NNS_Tga` format.

4.1.3.2 Transparent texels

Unless the retail product's texture format is A3I5 Translucent or A5I3 Translucent, texels are either transparent or opaque. The method for setting transparent texels depends on the Photoshop image mode and the texture format on the retail machine..

When the Image Mode is not Indexed Color, and when the texture format on the retail machine is 4x4 Texel Compressed or Direct Color, texels for which the 8-bit alpha value in the alpha channel is less than 128 will be transparent. If no alpha channel is present, all texels will be opaque.

When the Image Mode is Indexed Color, and when the texture format on the retail machine is 4-Color Palette, 16-Color Palette or 256-Color Palette, texels that are drawn using the color that is set as transparent in the color table are transparent. Even if an alpha channel is present, it will be ignored. However, notice that the color table's transparent color will not be reflected in a 3D CG tool's display.

To set the color table's transparent color, first select [Mode] then [Color Table] on the [Image] menu, which will open the color table. Next click the Eyedropper icon to set the color. Any color in the color table can be set as a transparent color.

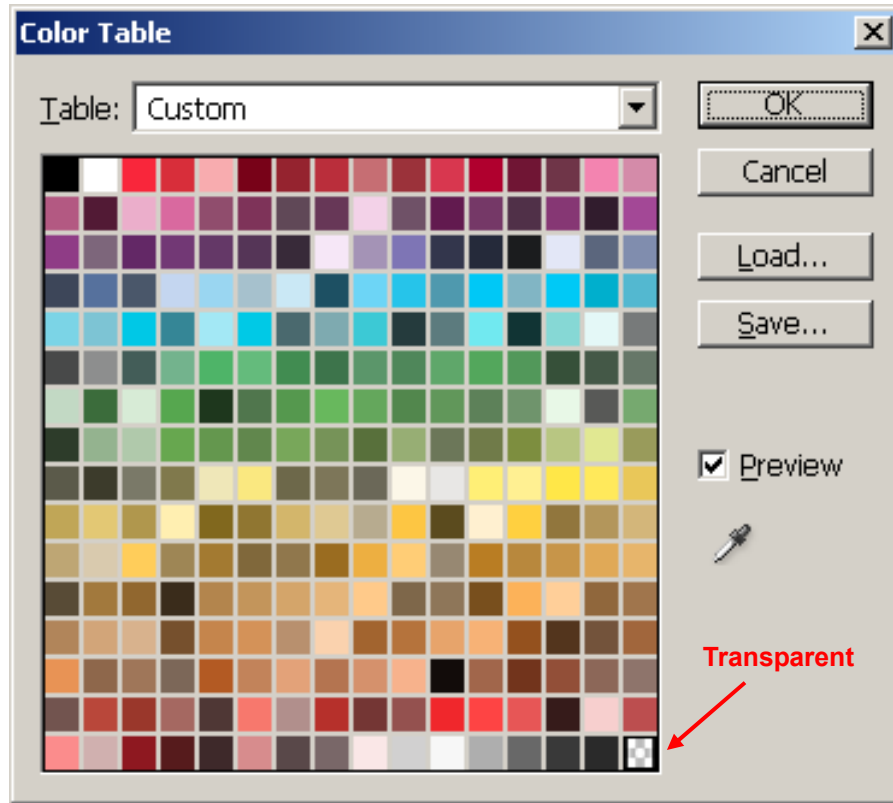


Figure 4-2 Transparent Color in the Color Table

When you convert from RGB Color to Indexed Color, if the Transparent option is on, a transparent color will be added to the color table automatically.

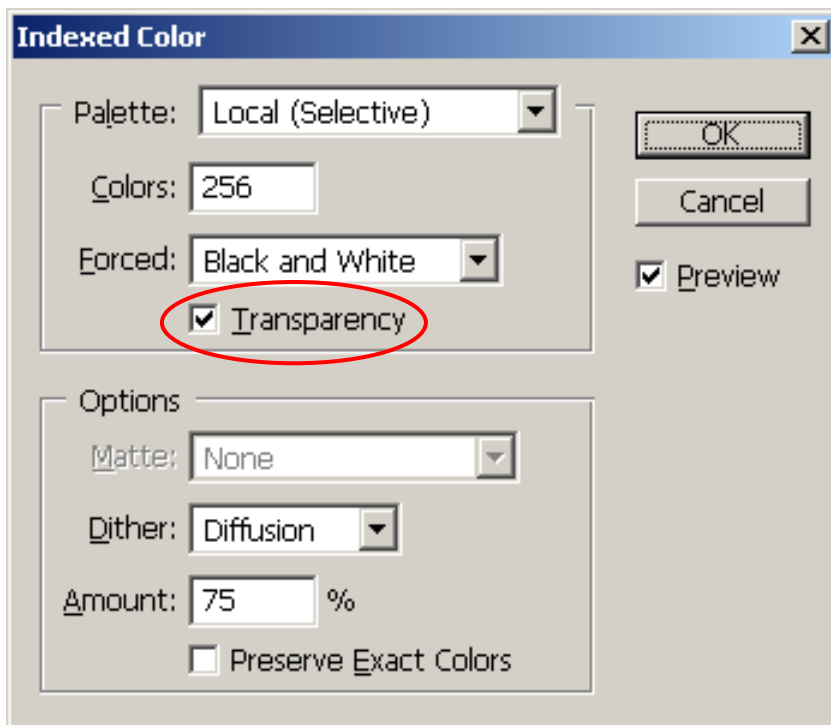


Figure 4-3 Converting from RGB Color to Indexed Color

4.1.3.3 Palette Data

When the retail product's texture format is 4-Color Palette, 16-Color Palette, 256-Color Palette, A3I5 Translucent, or A5I3 Translucent, the palette data that is output in the additional information will depend on whether the Image Mode is Indexed Color or another mode.

When the Image Mode is not Indexed Color, all of the colors used by the image will be output in the palette data. With 4-color, 16-color, and 256-color palettes, if transparent texels are present in the image, black ($R = 0$, $G = 0$, $B = 0$) will be appended to the beginning of the palette data. Palette data colors are ordered in ascending order using the value ($R + G \times 32 + B \times 1024$).

When the Image Mode is Indexed Color, all of the colors in the color table will be output in the palette data. If no transparent color is present, the palette data color order will be the same as the order in the color table. If a transparent color is present, it will move to the front of the palette data, and each of colors that preceded it will move one toward the back.

Regardless of the Image Mode, when the retail product's texture format is 4x4 Texel Compressed, the palette data that is output in the additional information will be decided both by the colors that are used in the image, the alpha channel, and by the 4x4 Texel Compressed Options.

4.1.3.4 Alpha Channels

A file that has more than one alpha channel cannot be properly saved as NNS_Tga. The next time it is loaded the alpha channels will disappear.

4.1.3.5 Layers

You cannot save layer information in NNS_Tga format. If you save a file that contains multiple layers in NNS_Tga format, the next time you load it, the image will be flattened.

If you save a file that contains only layers and no background in NNS_Tga format, the transparent areas will not be saved properly. The next time you load the file, the image will be flattened. Notice that if a transparent color is present in a color table, when you convert the Image Mode from Indexed Color to RGB Color, there will be no background, only a layer.

4.1.3.6 Saving (overwrite)

Photoshop 6.0.1 and 7.0.1

In Photoshop 6.0.1 and Photoshop 7.0.1, when you use overwrite save ([Save] on the [File] menu) to save a file that has once been saved in NNS_Tga format, if it is possible to save using the format that was used the last time the file was saved, the file will be save in that format—no dialog box will be displayed.

If you want to display the dialog box, select [Save As] on the [File] menu.

If, due to an increase in the number of colors or the like, it is not possible to save in the previous format, a dialog box will appear, even if you select to overwrite when saving. Notice that at this time a format that is consistent with the condition of the file will be selected.

Photoshop CS and Later

In Photoshop CS and later, even when you use overwrite save ([Save] on the [File] menu) to save a file that has once been saved in NNS_Tga format the dialog box will be displayed every time.

4.1.3.7 Maintaining Image Quality

No matter which format you save in, the image quality in Photoshop will be maintained. For example, even if you save in A3I5 translucent format, the color depth of the alpha channel in Photoshop will not become 3 bits, but will be maintained at 8 bits.

If you want to make a Photoshop-quality image as it would look on the retail product, use the Color Depth Filter Plug-in or the 4x4 Texel Compressed Texture Filter Plug-in.

4.2 PIC Format Plug-in

This plug-in saves and loads SOFTIMAGE PIC files that have additional Nintendo NITRO-System information. This additional information includes the texture format, the palette name, texel data, palette data, and the like. When intermediate files are output from 3D CG tools, this information will be reflected in the intermediate files.

4.2.1 Saving

To save a PIC file that has additional Nintendo NITRO-System information, select [Save As] on the

[File] menu and select the file format, `NNS_Pic`.

When you click the [Save] button, a dialog box will appear.

Option details are the same as for the TGA format plug-in. For details see “4.1.1 Saving.”

4.2.2 Loading

To load a PIC file that has additional Nintendo NITRO-System information, select [Open] on the [File] menu, select the file, and click the Open button.

In the Windows version of Photoshop, you can also open by dragging and dropping a PIC file into the Photoshop window.

4.2.3 Cautions

Cautions are the same as for the TGA format plug-in. For details, see “4.1.3 Cautions.”

5 4x4 Texel Compressed Textures: Cautions

The process for saving `NNS_Tga` files and `NNS_Pic` files that is used when a 4x4 texel compressed texture filter has been applied is different than the process that is used when the filter has not been applied. The following sections describe this difference.

5.1 When a 4x4 Texel Compressed Texture Filter has been Applied

If you apply a 4x4 texel compressed texture filter and do not subsequently alter the image, when you save the image in 4x4 Texel Compressed format, the data for the filtered condition will be output in the additional information (it will not be recompressed).

Note: If you save after you have applied a 4x4 texel compressed texture filter, you will not be able to return the Photoshop image quality to the same condition it was in before filtering. If you have applied the filter, be careful to not overwrite the unfiltered file with this data.

If you do alter the image after you have applied the 4x4 texel compressed texture filter, processing will be the same as if no filter had been applied.

5.2 When a 4x4 Texel Compressed Texture Filter has not been Applied

If an image has not been filtered with the 4x4 texel compressed texture filter, and you save it in 4x4 Texel Compressed format, the data for the compressed condition of the image that is being saved will be output in the additional information.

In this case, the Photoshop image quality remains the same as before compression. Therefore image quality will not degrade each time you save.

However, if you want to confirm its compressed appearance, you will have to display it on the retail product.

Windows is a registered trademark or trademark of Microsoft Corporation (USA) in the U.S. and other countries.

Mac, Macintosh, and Mac OS are registered trademarks or trademarks of Apple Computer, Inc. (USA).

Maya is a registered trademark or trademark of Alias Systems KK.

Photoshop and Adobe are registered trademarks or trademarks of Adobe Systems Incorporated.

All other company names and product names are the trademark or registered trademark of the respective companies.

© 2004-2006 Nintendo

The contents of this document cannot be duplicated, copied, reprinted, transferred, distributed or loaned in whole or in part without the prior approval of Nintendo.