

TWL-System Photoshop Plug-Ins

How to Use the Photoshop Plug-Ins

2009/03/04

**The content of this document is highly confidential
and should be handled accordingly.**

Confidential

These coded instructions, statements, and computer programs contain proprietary information of Nintendo and/or its licensed developers and are protected by national and international copyright laws. 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.....	7
2	Plug-In Types	8
2.1	Maya Version	8
3	Filter Plug-Ins.....	9
3.1	Color Depth Filter Plug-In	9
3.1.1	Using the Filter	9
3.1.2	Cautions	9
3.1.2.1	Image Mode.....	9
3.2	4x4 Texel Compressed Texture Filter Plug-In	10
3.2.1	Using the Filter	10
3.2.2	Cautions	11
3.2.2.1	Image Mode.....	11
3.2.2.2	Alpha Channels	11
3.2.2.3	Layers	11
3.2.2.4	Refiltering	11
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	13
4.1.1.3	4x4 Texel Compressed Options.....	14
4.1.1.4	Preview Function	14
4.1.2	Loading.....	14
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	16
4.1.3.4	Alpha Channels	16
4.1.3.5	Layers	17
4.1.3.6	Saving (Overwrite).....	17
4.1.3.7	Maintaining Image Quality	17
4.1.3.8	Color Configuration.....	17
4.2	PIC Format Plug-In	18
4.2.1	Saving.....	18
4.2.2	Loading.....	18

4.2.3	Cautions	18
5	4x4 Texel Compressed Textures: Cautions	19
5.1	When a 4x4 Texel Compressed Texture Filter Has Been Applied	19
5.2	When a 4x4 Texel Compressed Texture Filter Has Not Been Applied	19

Tables

Table 2-1 Plug-In Types	8
Table 4-1 Format Selection Conditions	13

Figures

Figure 3-1 NNS_ColorDepth Dialog Box	9
Figure 3-2 NNS_4x4Compressed Dialog Box	10
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	15
Figure 4-3 Converting from RGB Color to Indexed Color	16

Revision History

Revision Date	Description
2009/03/04	<p>New features/changes:</p> <ul style="list-style-type: none"> Added support for Windows 32-bit version of Adobe Photoshop CS4. <p>Edits in manual only/revisions:</p> <ul style="list-style-type: none"> Added support for plug-in version 1.0.5 2009-03-04 (see entry under New features/changes).
2008/10/08	Made revisions in line with the name change (from NITRO-System to TWL-System).
2008/06/18	<p>New features/changes:</p> <ul style="list-style-type: none"> Ended support for Adobe 7.0.1. <p>Bug fixes:</p> <ul style="list-style-type: none"> Fixed a bug that prevented the entire dialog box from being displayed when a DPI greater than 96 was configured in the Windows display settings. <p>Edits in manual only/revisions:</p> <ul style="list-style-type: none"> Added support for version 1.0.5 2008-06-18 (see entry under New features/changes, above).
2008/04/08	<p>Edits in manual only/revisions:</p> <ul style="list-style-type: none"> Changed the format of the revision history in the Japanese version. Changed the subtitle on the cover page.
2007/09/10	<p>New features/changes:</p> <ul style="list-style-type: none"> Added support for Adobe Photoshop CS3, Windows version. <p>Bug fixes:</p> <ul style="list-style-type: none"> Changed so that when there is a space at the beginning or the end of the name set in the Palette Name option, the space is removed and then the name is saved.
2007/05/22	Changed date format.
2007/01/29	<p>New features/changes:</p> <ul style="list-style-type: none"> Removed support for Photoshop 6.0.1 for Windows. Removed support for Photoshop for Mac 6.01/7.01/CS. <p>Bug fixes:</p> <ul style="list-style-type: none"> Made a fix so that when overwriting and saving an NNS_Tga (NNS_Pic) in Photoshop CS and later, no dialog box would be displayed if it is possible to save the file in the same format as when it was previously saved (p.16). <p>Edits in manual only/revisions:</p> <ul style="list-style-type: none"> Added to section 4.1.3.4 Alpha Channels. Added section 4.1.3.8 Color Configuration.
2005/11/28	<ul style="list-style-type: none"> Added support for Adobe Photoshop CS2 (9.0) for Windows. Added cautions regarding Photoshop CS or later to section 4.1.3.6 Saving (Overwrite)."
2005/06/20	<p>New features/changes:</p> <ul style="list-style-type: none"> Added preview feature and data volume display to NNS_Tga and NNS_Pic (sections 4.1.1 and 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

Revision Date	Description
	<p>format or when the 4x4 texel-compressed texture filter is used, the palette size may be larger than in previous versions.) (sections 3.2.1 and 4.1.1.3)</p> <p>Edits in manual only/revisions:</p> <ul style="list-style-type: none">• Revised section 4.1.3.3 Palette Data.• Revised section 4.1.3.7 Maintaining Image Quality.
2005/03/24	<p>Additions/revisions to manual only:</p> <ul style="list-style-type: none">• Revised section 4.1.3.2 Transparent Texels.• Revised section 4.1.3.3 Palette Data.
2005/02/28	<ul style="list-style-type: none">• Changed the font in the dialog box of the Windows version plug-in.
2004/09/27	<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 plug-in.• Added caution regarding the memory in the Macintosh version of the plug-in in the manual. (p. 6)
2004/07/26	<ul style="list-style-type: none">• Change: When saving a file as NNS Tga (NNS_Pic), if the file has never been saved as NNS_Tga (NNS_Pic), 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)
2004/6/28	Internal revisions to reading and writing of additional information.
2004/5/24	Initial version.

1 Operating Environment

These plug-ins are for use with the Windows 32-bit versions of Adobe Photoshop: CS (8.0.1), CS2 (9.0.2), CS3 (10.0.1), and CS4 (11.0). Their behavior is not guaranteed in other versions.

Note that all of the images in this manual show these plug-ins in Adobe Photoshop CS2.

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 filter saves and loads Targa (TGA) files that have additional Nintendo TWL-System information.
	NNS_Pic	PIC format plug-in. This filter saves and loads Softimage PIC files that have additional Nintendo TWL-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 set it so that colors that become the same in the retail product are not registered multiple times in a color table.

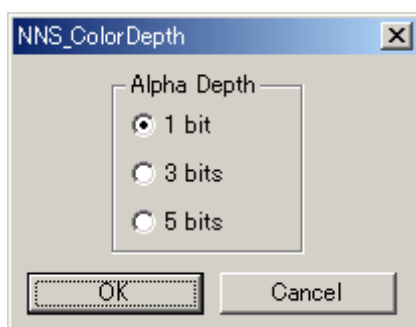
3.1.1 Using the Filter

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

If you have not selected an alpha channel, filtering occurs immediately.

If you have selected an alpha channel, the **NNS_ColorDepth** dialog box appears.

Figure 3-1 NNS_ColorDepth Dialog Box



To filter, select the alpha depth and then click **OK**.

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.

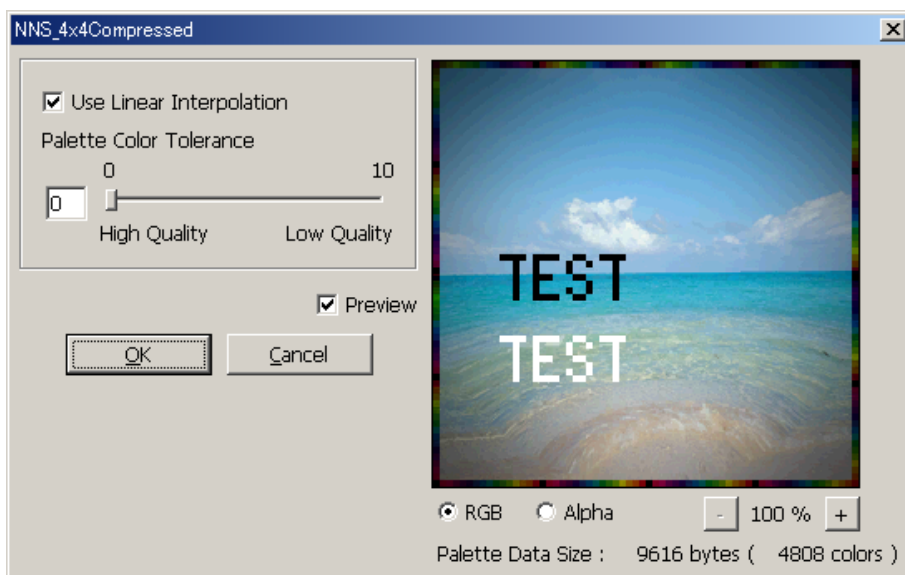
3.2 4x4 Texel Compressed Texture Filter Plug-In

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

When you select all of the background channels and then, on the **File** menu, select **Nintendo NITRO-System → NNS_4x4Compressed**, the following dialog box appears.

Figure 3-2 NNS_4x4Compressed Dialog Box



- **Use Linear Interpolation**

When the **Use Linear Interpolation** option is selected, there will be a maximum of 2 palettes for each 4x4 texel; when it is not selected there will be a maximum of 4 palettes for each 4x4 texel.

Although image quality is generally better when linear interpolation is not used, palette data size increases more than it would if linear interpolation is used.

- **Palette Color Tolerance**

This control specifies the color standardization range that is used for palette compression. Two colors are considered the same if each of their RGB channels (5 bits) differs by a value that is less than or equal to the value specified.

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

- **Preview**

If selected, a preview image and the palette data size display. Palette data size is always a multiple of 16 bytes.

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

To change the scale factor of the preview image, click the **+** or **-** buttons, or use the mouse wheel.

To filter, click **OK**.

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, hold down SHIFT and click the left mouse button to run the filter with all channels selected.

If more than one alpha channel is present, the filter will not run.

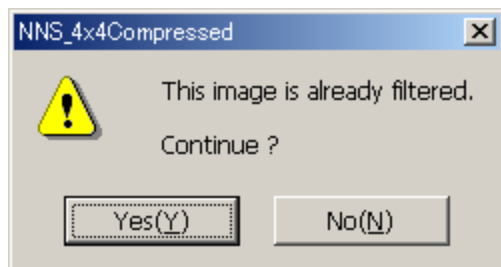
3.2.2.3 Layers

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 message appears.

Figure 3-3 NNS_4x4Compressed Refilter Warning Dialog Box



To continue, click **Yes**. To stop, click **No**.

Note that if the Palette Color Tolerance value is not 0, the image may change each time you filter.

3.2.2.5 Running the Filter from Actions

If `NNS_4x4Compressed` was previously applied and you run the filter from **Actions**, it will run using the previously applied options.

Likewise, if you previously saved an `NNS_Tga` (`NNS_Pic`) format file in 4x4 Texel Compressed format, it will save using the previously applied options.

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

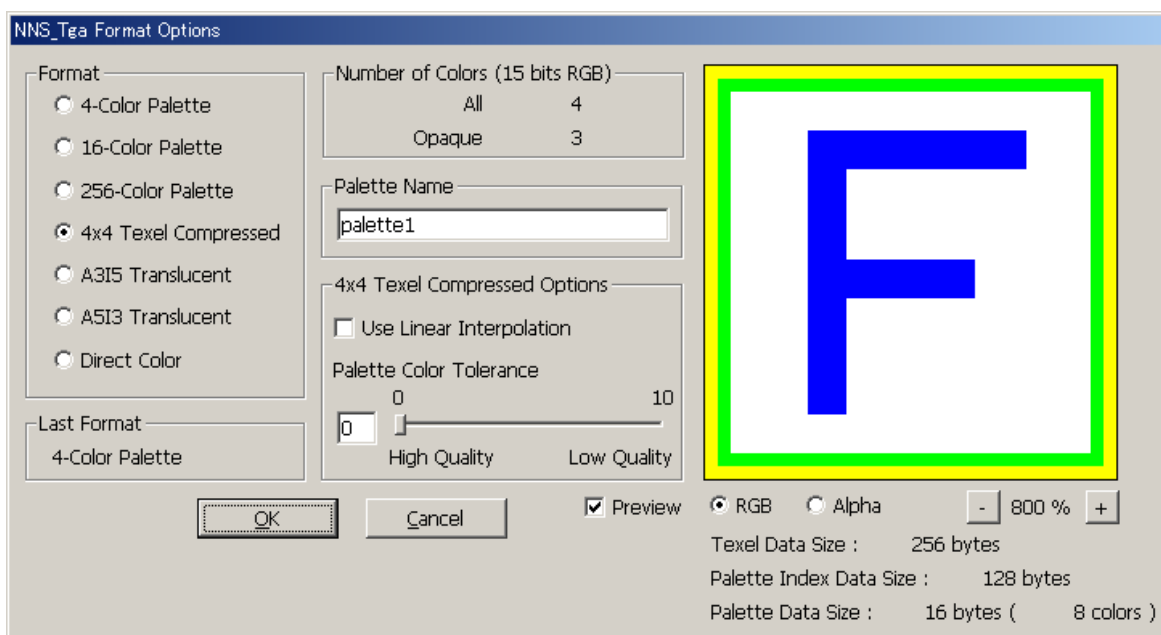
This plug-in saves and loads Targa (TGA) files that contain additional Nintendo TWL-System information. The additional information includes the texture format, palette name, texel data, and palette data. When intermediate files are output from 3DCG tools, this information will be reflected in the intermediate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

4.1.1 Saving

To save a TGA file that contains additional Nintendo TWL-System information, from the **File** menu, select **Save As**, and then select the file format `NNS_Tga`.

When you click **Save**, the following dialog box opens.

Figure 4-1 NNS_Tga Dialog Box



The number of colors that are used in an image is displayed under **Number of Colors (15-bit RGB)**.

For any Image Mode other than Indexed Color, given a color depth of 5 bits each of R, G, and B, this displays the number of colors. **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.

The most recent format used when a file was saved as `NNS_Tga` is displayed under **Last Format**.

To save, select the appropriate options and then click **OK**.

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, for a file that was saved previously as `NNS_Tga`, the last saved file format will be selected if it is possible to save in that format.

Also, if a 4x4 texel compressed texture filter is currently applied, **4x4 Texel Compressed** is 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.

4.1.1.2 Palette Name Options

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

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

The intermediate file output plug-ins for 3DCG 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: When using the Nintendo TWL–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 this is selected, there will be a maximum of 2 palettes for each 4x4 texel; when it is not selected, there will be a maximum of 4 palettes for each 4x4 texel.

Although image quality is generally better when linear interpolation is not used, palette data size increases more than it would if linear interpolation is used.

- **Palette Color Tolerance**

This specifies the color standardization range used for palette compression. Two colors are considered the same if each of their RGB channels (5 bits) differs by a value that is less than or equal to the value specified.

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

4.1.1.4 Preview Function

When **Preview** is selected, the preview image and data size (texel, palette index, and palette) are 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.

To switch between **RGB** and **Alpha** displays, use the option buttons. The alpha display reflects transparent colors in the alpha channel or color table.

To change the preview image's magnification, use the **+** and **-** buttons, or use the mouse wheel.

4.1.2 Loading

To load a TGA file that has additional Nintendo TWL-System information, on the **File** menu, click **Open**, select the file, and then click **Open**.

You can also load a TGA file by dragging it 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

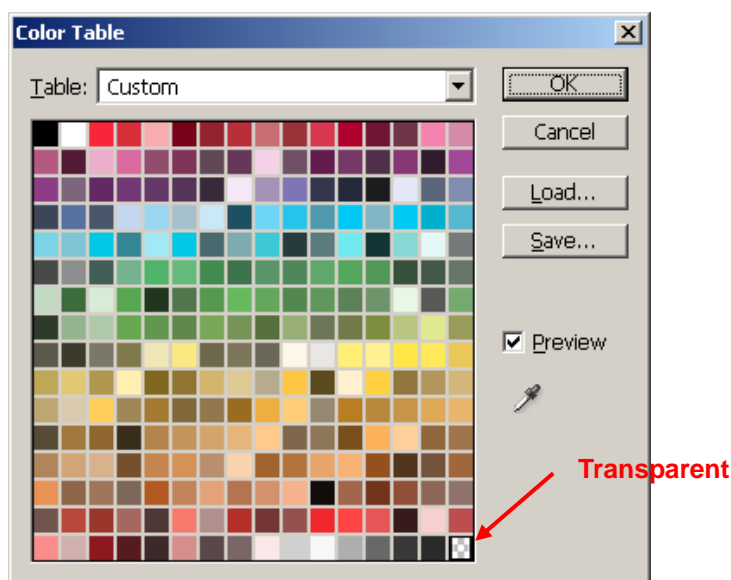
Texels are either transparent or opaque, unless the retail product's texture format is A3I5 Translucent or A5I3 Translucent. The method for setting transparent texels depends on the Photoshop image mode and the texture format on the retail machine.

When the Image Mode is not Indexed Color, and 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.

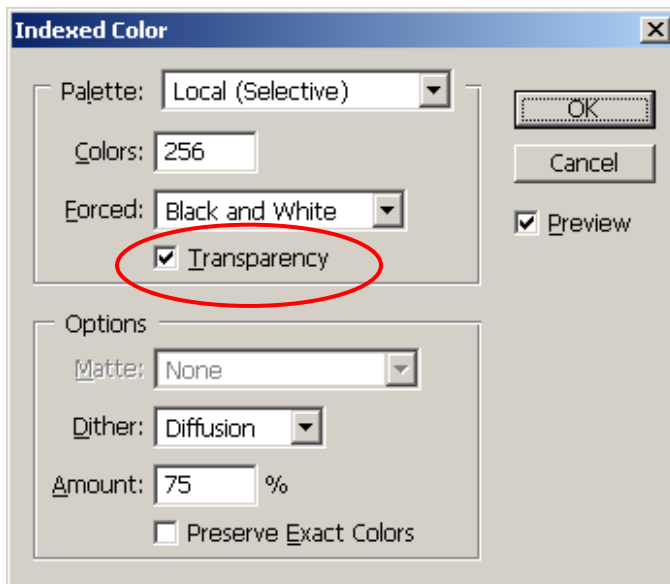
When the Image Mode is Indexed Color, and the texture format on the retail machine is 4-Color Palette, 16-Color Palette, or 256-Color Palette, texels that are drawn using the color that is set as transparent in the color table are transparent. Even if an alpha channel is present, it will be ignored.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

To set the color table's transparent color, on the **Image** menu, click **Mode**, and then click **Color Table**. In the color table, 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



In the **Indexed Color** dialog box, if the **Transparency** option is selected, a transparent color will automatically be added to the color table when you convert from RGB Color to Indexed Color.

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. For 4-color, 16-color, and 256-color palettes, if transparent texels are present in the image, black ($R = 0$, $G = 0$, $B = 0$) is appended to the beginning of the palette data. Palette data colors appear 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 is 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

The brightness of a Photoshop alpha channel is changed with Photoshop's color configuration. However, NNS_Tga files do not use this color configuration; instead, they are saved with an 8-bit K value that determines their alpha. (For example, when $K=0\%$, the alpha is 255; when $K=50\%$, the alpha is 128; and when $K=100\%$, the alpha is 0. Photoshop saves the K value internally as an 8-bit value.)

A file with 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. Note 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)

When you use overwrite save (on the **File** menu, click **Save**) to save a file that was once saved in `NNS_Tga` format, if possible it will be saved with the previously used format. However, no dialog box appears.

If you want a dialog box to display, on the **File** menu, click **Save As**.

If, for example, due to an increase in the number of colors it is not possible to save using the previous format, a dialog box appears, even if you chose to overwrite while saving. Note that a format consistent with the condition of the file is selected.

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; it will be maintained at 8 bits.

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

4.1.3.8 Color Configuration

The brightness of a Photoshop grayscale or alpha channel is changed with Photoshop's color configuration. However, `NNS_Tga` files do not use this color configuration; instead, they are saved with an 8-bit K value that determines their alpha. (For example, when K=0%, the alpha is 255; when K=50%, the alpha is 128; and when K=100%, the alpha is 0. Photoshop saves the K value internally as an 8-bit value.)

When saving a TGA file as an `NNS_Tga`, no color configuration information is saved.

Setting the following color configurations will allow for the Photoshop grayscale and alpha channel brightness to be roughly proportionate to the K value:

(Display More Options)

- RGB: sRGB IEC61966-2.1
- Gray: sGray
- Use Dithering: OFF

4.2 PIC Format Plug-In

This plug-in saves and loads Softimage PIC files that have additional Nintendo TWL-System information. This additional information includes the texture format, the palette name, texel data, and palette data. When intermediate files are output from 3DCG tools, this information is reflected in the intermediate files.

4.2.1 Saving

To save a PIC file that has additional Nintendo TWL-System information, on the **File** menu, click **Save As**, and then select the file format `NNS_Pic`.

When you click **Save**, a dialog box appears.

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

4.2.2 Loading

To load a PIC file that has additional Nintendo TWL-System information, on the **File** menu, click **Open**, select the file, and then click **Open**.

You can also open a PIC file by dragging into the Photoshop window.

4.2.3 Cautions

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

5 4x4 Texel Compressed Textures: Cautions

The process used for saving `NNS_Tga` files and `NNS_Pic` files when a 4x4 texel compressed texture filter has been applied is different than that 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 a file after you have applied a 4x4 texel compressed texture filter, you will not be able to return the Photoshop image quality back to the same condition it was in before filtering. If you have applied the filter, be careful not to overwrite the unfiltered file with this data.

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

5.2 When a 4x4 Texel Compressed Texture Filter Has Not Been Applied

If an image was not 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 it was before compression. Therefore, image quality will not degrade each time you save.

However, to confirm its compressed appearance, you must display it on the retail product.

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

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

Softimage is a registered trademark or trademark of Autodesk, Inc. in the U.S. and other countries.

All other company names and product names in this document are the trademarks or registered trademarks of the respective companies.

© 2004-2009 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.