



## A Turner Designs Product Update

### Effects Of Turbidity On *In Vivo* Chlorophyll Fluorescence

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Turbidity can have two primary effects on chlorophyll readings:

1. It may increase blank due to increased light scatter.
2. It may reduce the fluorescence reading due to light absorption.

The extent to which turbidity affects fluorescence depends upon the turbidity level, its variability, and the composition of compounds creating the turbid environment. Slight, consistent turbidity levels will have a minimal effect upon *in vivo* chlorophyll levels. High and variable turbidity levels can introduce significant errors.

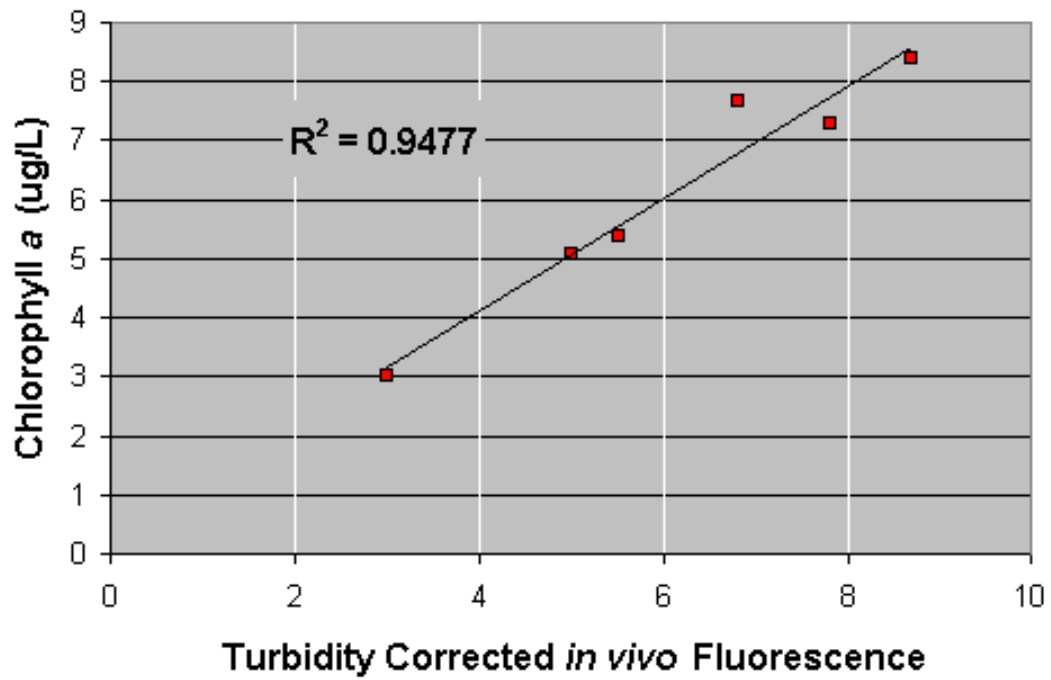
#### Method

To determine and correct for turbidity effects on *in vivo* chlorophyll readings, you need 3 pieces of information.

1. *in vivo* chlorophyll data
2. Turbidity data
3. Extracted chlorophyll values of grab samples, which correspond to the *in vivo* and turbidity data

While taking field measurements, collect periodic grab samples for extracted chlorophyll analysis (5-10 or more if preferred). If sampling over dramatically different environments (example: freshwater river  $\neq$  estuary  $\neq$  coastal shelf), you should collect a set of grab samples for each different environment. Extract and measure the chlorophyll from each of your grab samples. With this data, perform a multiple regression, modeling the *in vivo* chlorophyll data and turbidity data (independent variables) to the extracted chlorophyll data (dependent variable). This can be performed with any number of different statistical or spreadsheet programs.

## Turbidity Corrected



## Without Turbidity Correction

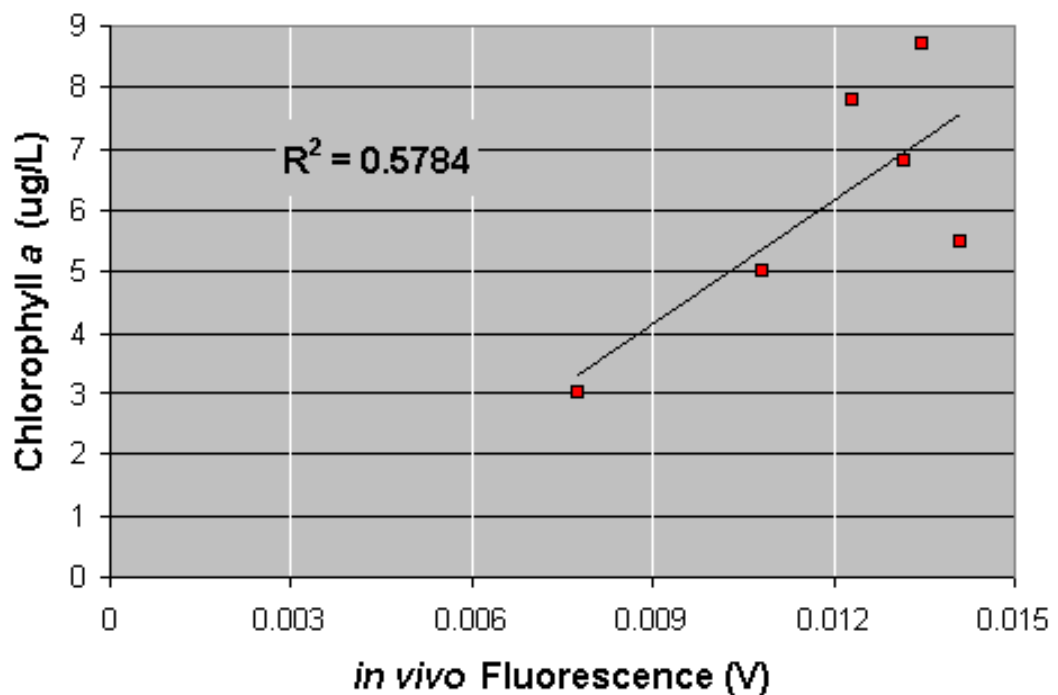


Figure 1. Comparison of *in vivo* to extracted chlorophyll concentration with and without turbidity corrections.

### Calculation

To correct and convert your *in vivo* chlorophyll data into actual chlorophyll data, create the following equation from the results of your multiple regression:

$$y = m_x x + m_z z + b$$

**Where:**

$y$  = corrected chlorophyll value

$m_x$  = coefficient (slope) for *in vivo* chl

$m_z$  = coefficient (slope) for turbidity

$b$  =  $y$  intercept

Use your turbidity and *in vivo* chlorophyll data to calculate the actual chlorophyll concentration for the rest of your data.

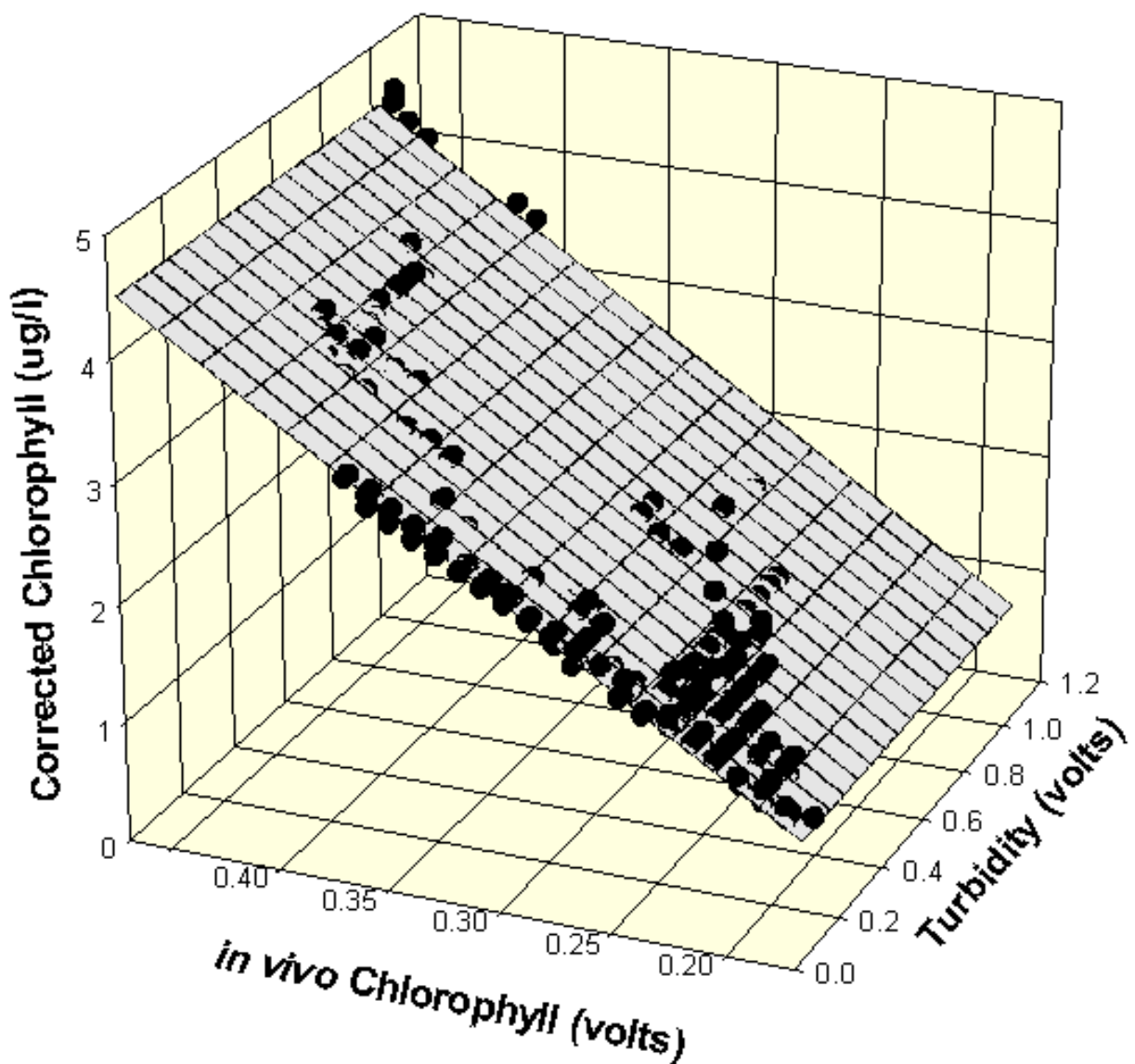


Figure 2. XYZ scatter of USGS field data showing the effect of turbidity on chlorophyll a concentrations.

Turner Designs offers the SCUFA®™ and *Aquafluor*™. Both are dual channel fluorometers with dedicated *in vivo* chlorophyll and turbidity channels, enabling the user to easily collect the appropriate data for the turbidity correction.



Turner Designs manufactures more fluorometers and research grade luminometers than any other company in the world.

[fluorometer.com](http://fluorometer.com)mitted™