WHAT IS CLAIMED IS:

1. A fluorometer for monitoring environmental water quality by identifying a fluorescence species-of-interest in a water sample that contains overlapping fluorescence species, comprising:

a signal processor or processing module configured to:

receive signaling containing information about excitation light reflected off one or more fluorescence species-of-interest in a water sample, the excitation light having a modulation frequency and being swept across a variable frequency range from an initial modulation frequency f_i to a final modulation frequency f_f, the information including a characteristic optical frequency corresponding to a fluorescence species-of-interest in the water sample, and a characteristic/lifetime optical frequency corresponding to a distinct fluorescence lifetime in which the fluorescence species-of-interest remains in an excited state, the modulation frequency being swept across the variable frequency range including the characteristic optical frequency corresponding to the fluorescence species-of-interest in the water sample, and also including a midpoint of a relative phase transition at 45 degrees corresponding to the characteristic/lifetime optical frequency of the fluorescence species-of-interest; and

provide corresponding signaling containing information about an identity of the fluorescence species-of-interest detected and distinguished from overlapping fluorescence species in the water sample using the characteristic/lifetime optical frequency, based upon the signaling received

2. A fluorometer according to claim 1, wherein the fluorometer comprises a light sensor configured to sense the excitation light across the variable frequency range, and provide the signaling.

3. A fluorometer according to claim 2, wherein the light sensor is a linear sensor array configured to sense the excitation light across the variable frequency range along a length of a light source providing the excitation light.

4. A fluorometer according to claim 1, wherein the fluorometer comprises a light source configured to sweep the excitation light across the variable frequency range to excite the one or more fluorescence species-of-interest.

5. A fluorometer according to claim 4, wherein the light source is a swept-frequency light source, including a quasi-collimated light source.

6. A fluorometer according to claim 1, wherein the fluorometer is a swept frequency fluorometer.

7. A method for monitoring environmental water quality by identifying a fluorescence species-of-interest in a water sample that contains overlapping fluorescence species, comprising:

receiving, with a signal processor or processing module forming part of a fluorometer, signaling containing information about excitation light that excites one or more fluorescence species-of-interest in a water sample, the excitation light having a modulation frequency and being swept across a variable frequency range from an

initial modulation frequency f_i to a final modulation frequency f_f, the information including a characteristic optical frequency corresponding to a fluorescence species-of-interest in the water sample, and a characteristic/lifetime optical frequency corresponding to a distinct fluorescence lifetime in which the fluorescence species-of-interest remains in an excited state, the modulation frequency being swept across the variable frequency range including the characteristic optical frequency corresponding to the fluorescence species-of-interest in the water sample, and also including a midpoint of a relative phase transition at 45 degrees corresponding to the characteristic/lifetime optical frequency of the fluorescence species-of-interest; and

providing, with the signal processor or processing module, corresponding signaling containing information about an identity of the fluorescence species-of-interest detected and distinguished from overlapping fluorescence species in the water sample using the characteristic/lifetime optical frequency, based upon the signaling received.

8. A method according to claim 7, wherein the method comprises configuring a light sensor to sense the excitation light across the variable frequency range, and provide the signaling.

9. A method according to claim 8, wherein the method comprises configuring the light sensor as a linear sensor array to sense the excitation light across the variable frequency range along a length of a light source providing the excitation light.

10. A method according to claim 7, wherein the method comprises configuring a light source to sweep the excitation light across the variable frequency range to excite the one or more fluorescence species-of-interest.

11. A method according to claim 10, wherein the method comprises configuring the light source as a swept-frequency light source, including a quasi-collimated light source.

12. A method according to claim 7, wherein the method comprises configuring the signal processor or signal processing module as part of a swept frequency fluorometer.

13. A swept frequency fluorometer for monitoring environmental water quality by identifying a fluorescence species-of-interest in a water sample that contains overlapping fluorescence species, comprising:

a light source configured to provide excitation light on a water sample having one or more fluorescence species-of-interest, the excitation light having a modulation frequency and being swept across a variable frequency range from an initial frequency f_i to a final frequency of f_f, the modulation frequency being swept across the variable frequency range including the characteristic optical frequency corresponding to the fluorescence species-of-interest in the water sample, and also including a midpoint of a relative phase transition at 45 degrees corresponding to the characteristic/lifetime optical frequency of the fluorescence species-of-interest;

a light sensor configured to sense the excitation light reflected off the fluorescence species-of-interest in the water sample and provide signaling

containing information about the excitation light reflected off the one or more fluorescence species-of-interest in the water sample, the information including a characteristic optical frequency corresponding to a fluorescence species-of-interest in the water sample, and a characteristic/lifetime optical frequency corresponding to a distinct fluorescence lifetime in which the fluorescence species-of-interest remains in an excited state; and

a signal processor or processing module configured to:

receive the signaling, and

provide corresponding signaling containing information about an identity of the fluorescence species-of-interest detected and distinguished from overlapping fluorescence species in the water sample using the characteristic/lifetime optical frequency, based upon the signaling received.

14. A swept frequency fluorometer according to claim 13, wherein

the light source is a swept-frequency light source, including a quasi-collimated light source; and

the light sensor is a linear sensor array configured to sense the excitation light across the variable frequency range along a length of a light source providing the excitation light.