CLAIMS

1. A craft comprising:

at least one hull;

at least one wing configured to generate upwards aero lift as air flows past the at least one wing to facilitate wing-borne flight of the craft;

at least one hydrofoil configured to generate upwards hydrofoil lift during a first mode of operation as water flows past the at least one hydrofoil to facilitate hydrofoil-borne movement of the craft through the water; and

a control system, wherein while the craft is hydrofoil-borne, the control system is configured to:

determine upwards aero lift generated by the at least one wing;

while the upwards aero lift is below a threshold lift, control the at least one hydrofoil to generate downwards hydrofoil lift that maintains the at least one hydrofoil at least partially submerged in the water; and

after determining that the upwards aero lift corresponds to the threshold lift, control the at least one hydrofoil to increase or decrease the downwards hydrofoil lift generated by the at least one hydrofoil.

2. The craft according to claim 1, wherein the threshold lift corresponds to a lift that is sufficient to allow the craft to transition from hydrofoil-borne movement through the water to sustained wing-borne flight.

3. The craft according to claim 1, wherein while the craft is hydrofoil-borne, the at least one hull is lifted above the water.

4. The craft according to claim 1, wherein the control system is configured to control the at least one hydrofoil to increase the downwards hydrofoil lift generated by the at least one hydrofoil in proportion to an increase in the upwards aero lift generated by the at least one wing.

5. The craft according to claim 1, wherein when determining the upwards aero lift generated by the at least one wing, the control system is configured to:

determine a speed of the craft; and

determine the upwards aero lift generated by the at least one wing based at least in part on the determined speed of the craft.

6. The craft according to claim 1, wherein when determining the upwards aero lift generated by the at least one wing, the control system is configured to:

determine the upwards aero lift generated by the at least one wing based at least in part on an angle of attack of the at least one wing, a speed of the craft, and respective deflection angles of one or more control surfaces of the at least one wing.

7. The craft according to claim 1, wherein the craft comprises a sensor configured to sense a load force on the at least one hydrofoil, wherein when determining the upwards aero lift generated by the at least one wing, the control system is configured to:

determine a sensed load force on the at least one hydrofoil; and

determine the upwards aero lift generated by the at least one wing based at least in part on a sensed load force.

8. The craft according to claim 1, wherein when determining the upwards aero lift generated by the at least one wing, the control system is configured to:

determine lift generated by the at least one hydrofoil based at least in part on an angle of attack of the at least one hydrofoil, a speed of the craft, and respective deflection angles of one or more control surfaces of the at least one hydrofoil.

9. The craft according to claim 1, wherein the at least one hydrofoil comprises one or more control surfaces, wherein the control system is configured to adjust respective deflection angles of the one or more control surfaces to thereby control the downwards hydrofoil lift generated by the at least one hydrofoil.

10. The craft according to claim 1, wherein an angle of incidence of the at least one hydrofoil is adjustable, wherein the control system is further configured to adjust the angle of incidence of the at least one hydrofoil to thereby control the downwards hydrofoil lift generated by the at least one hydrofoil.

11. A craft comprising:

a hull;

a wing configured to generate upwards aero lift as air flows past the wing to facilitate wing-borne flight of the craft;

a hydrofoil configured to generate upwards hydrofoil lift during a first mode of operation as water flows past the hydrofoil to facilitate hydrofoil-borne movement of the craft through the water;

at least one processor; and

tangible, non-transitory computer-readable media that comprises program instructions executable by the at least one processor to configure the craft to:

as the craft accelerates, adjust downwards hydrofoil lift generated by the hydrofoil to maintain the hydrofoil at least partially submerged in the water; and

after determining that the upwards aero lift is sufficient to allow the craft to sustain flight, decrease the downwards hydrofoil lift generated by the hydrofoil to allow the hydrofoil to exit the water and the craft to become wing-borne.

12. The craft according to claim 11, wherein the hydrofoil is moveable, and wherein the tangible, non-transitory computer-readable media comprise further program instructions executable by the at least one processor to configure the craft to:

extend the hydrofoil below the hull of the craft for submersion in the water and to at least partially retract into the hull of the craft after the craft is wing-borne.

13. The craft according to claim 12, wherein the tangible, non-transitory computer-readable media that comprises program instructions executable by the at least one processor to configure the craft to adjust the downwards hydrofoil lift generated by the hydrofoil comprises program instructions executable by the at least one processor to configure the craft to:

adjust one or both of an angle or a distance at which the hydrofoil extends below the hull to thereby control the downwards hydrofoil lift generated by the hydrofoil.

14. The craft according to claim 11, wherein the tangible, non-transitory computer-readable media that comprises program instructions executable by the at least one processor to configure the craft to adjust the downwards hydrofoil lift generated by the hydrofoil comprises program instructions executable by the at least one processor to configure the craft to:

while the craft is hydrofoil-borne and the wing is generating the upwards aero lift, adjust the hydrofoil lift generated by the hydrofoil to transition from a positive lift that raises the craft to a negative lift that opposes the upwards aero lift to thereby maintain the hydrofoil at least partially submerged in the water while the craft accelerates.

15. The craft according to claim 11, wherein the tangible, non-transitory computer-readable media that comprises program instructions executable by the at least one processor to configure the craft to adjust the downwards hydrofoil lift generated by the hydrofoil comprises program instructions executable by the at least one processor to configure the craft to:

increase the downwards hydrofoil lift generated by the hydrofoil in proportion to an increase in the upwards aero lift generated by the wing.

16. The craft according to claim 11, wherein the tangible, non-transitory computer-readable media that comprises program instructions executable by the at least one processor to configure the craft to determine the upwards aero lift generated by the wing comprises program instructions executable by the at least one processor to configure the craft to:

determine a speed of the craft; and

determine the upwards aero lift generated by the wing based at least in part on the determined speed of the craft.

17. The craft according to claim 11, wherein the tangible, non-transitory computer-readable media that comprises program instructions executable by the at least one processor to configure the craft to determine the upwards aero lift generated by the wing comprises program instructions executable by the at least one processor to configure the craft to:

determine an angle of attack of the wing; and

determine the upwards aero lift generated by the wing based at least in part on an angle of attack of the wing.

18. The craft according to claim 11, wherein the craft comprises a sensor configured to sense a load force on the hydrofoil, wherein the tangible, non-transitory computer-readable media that comprises program instructions executable by the at least one processor to configure the craft to determine the upwards aero lift generated by the wing comprises program instructions executable by the at least one processor to configure the craft to:

determine a sensed load force on the hydrofoil; and

determine the upwards aero lift generated by the wing based at least in part on a sensed load force.

19. The craft according to claim 11, wherein the hydrofoil comprises one or more control surfaces, and wherein the tangible, non-transitory computer-readable media that comprises program instructions executable by the at least one processor to configure the craft to adjust the hydrofoil lift generated by the hydrofoil comprises program instructions executable by the at least one processor to configure the craft to:

adjust respective angles of deflection of the one or more control surfaces of the hydrofoil to thereby control the upwards hydrofoil lift and the downwards hydrofoil lift generated by the hydrofoil.