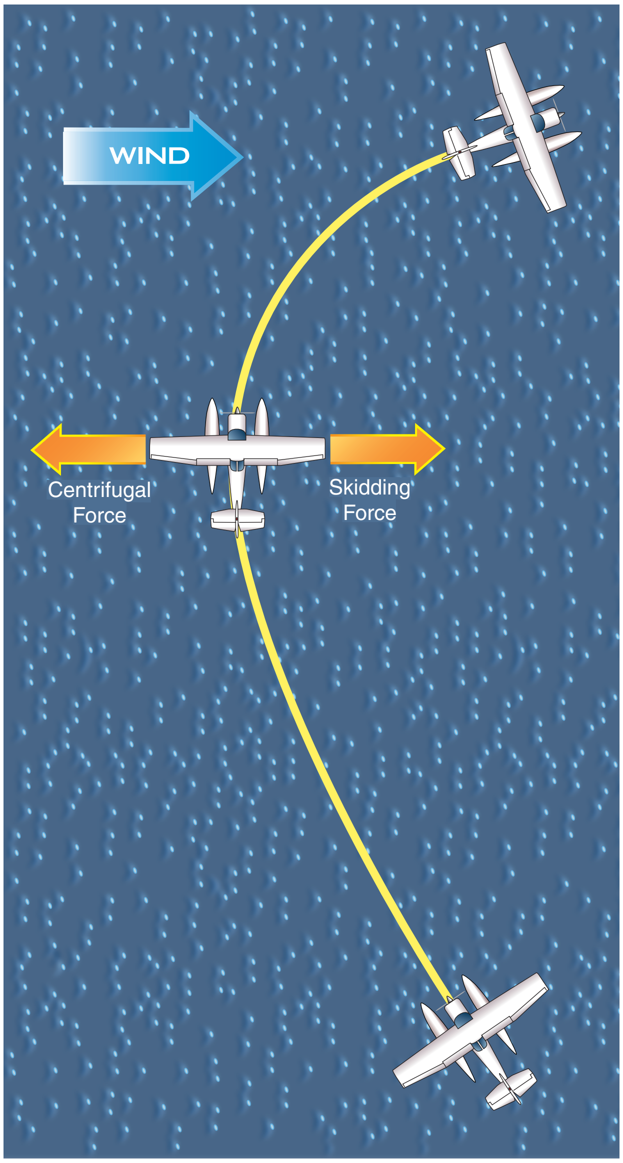

Figure 6-5. A downwind arc is one way to compensate for a crosswind.

DOWNWIND LANDING

Although downwind landings often require significantly more water area, there are occasions when they are more convenient or even safer than landing into the wind. Sometimes landing upwind would mean a long, slow taxi back along the landing path to get to the dock or mooring area. If winds are less than 5 knots and there is ample room, landing downwind could save taxi time. Unless the winds are light, a downwind landing is seldom necessary. Before deciding to land downwind, the pilot needs a thorough knowledge of the landing characteristics of the seaplane as well as the environmental factors in the landing area.

As with a downwind landing in a landplane, the main concern for a seaplane is the additional groundspeed added by the wind to the normal approach speed. The airspeed, of course, is the same whether landing upwind or downwind, but the wind decreases groundspeed in upwind landings and increases groundspeed in downwind landings. While a landplane pilot seldom thinks about the additional force placed on the landing gear by a higher groundspeed at touchdown, it is a serious concern for the seaplane pilot. A small increase in water speed translates into greatly increased water drag as the seaplane touches down, increasing the tendency of the seaplane to nose over. In light winds, this usually presents little problem if the pilot is familiar with how the seaplane handles when touching down at higher speeds, and is anticipating the increased drag forces. In higher winds, the nose-down force may exceed the ability of the pilot or the flight controls to compensate, and the seaplane will flip over at high speed. If the water's surface is rough, the higher touchdown speed also subjects the floats and airframe to additional pounding.

If there is a strong current, the direction of water flow is a major factor in choosing a landing direction. The speed of the current, a confined landing area, or the surface state of the water may influence the choice of landing direction more than the direction of the wind. In calm or light winds, takeoffs usually are made in the same direction as the flow of the current, but landings may be made either with or against the flow of the current, depending on a variety of factors. For example, on a narrow river with a relatively fast current, the speed of the current is often more significant than wind direction, and the need to maintain control of the seaplane at taxi speed after the landing run may present more challenges than the landing itself. It is imperative that even an experienced seaplane pilot obtain detailed information about such operations before attempting them for the first time. Often the best source of information is local pilots with comprehensive knowledge of the techniques that work best in specific locations and conditions.

GLASSY WATER LANDING

Flat, calm, glassy water certainly looks inviting and may give the pilot a false sense of safety. By its nature, glassy water indicates no wind, so there are no concerns about which direction to land, no crosswind to consider, no weathervaning, and obviously no rough water. Unfortunately, both the visual and the physical characteristics of glassy water hold potential hazards for complacent pilots. Consequently, this surface condition is frequently more dangerous than it appears for a landing seaplane.

The visual aspects of glassy water make it difficult to judge the seaplane's height above the water. The lack of surface features can make accurate depth perception very difficult, even for experienced seaplane pilots. Without adequate knowledge of the seaplane's height above the surface, the pilot may flare too high or too low. Either case can lead to an upset. If the seaplane flares too high and stalls, it will pitch down, very likely hitting the water with the bows of the floats and flipping over. If the pilot flares too late or not at all, the seaplane may fly into the water at relatively high speed, landing on the float bows, driving them underwater and flipping the seaplane. [Figure 6-6]

Besides the lack of surface features, the smooth, reflecting surface can lead to confusing illusions as clouds or shore features are reproduced in stunning detail and full color. When the water is crystal clear and glassy, the surface itself is invisible, and pilots may inadvertently judge height by using the bottom of the lake as a reference, rather than the water surface.

The lack of surface texture also presents a physical characteristic that adds slightly to the risk of glassy water landings. A nice smooth touchdown can result in faster deceleration than expected, for the same reason that the floats seem to stick to the surface during glassy water takeoffs: there is less turbulence and fewer air bubbles between the float bottoms and the water, which effectively increases the wetted surface area of the floats and causes higher drag forces. Naturally, this sudden extra drag at touchdown tends to pull the nose down, but if the pilot is expecting it and maintains the planing attitude with appropriate back pressure, the tendency is easily controlled and presents no problem.

There are some simple ways to overcome the visual illusions and increase safety during glassy water landings. Perhaps the simplest is to land near the shoreline, using the features along the shore to gauge altitude. Be certain that the water is sufficiently deep and free of obstructions by performing a careful inspection from a safe altitude. Another technique is to make the final approach over land, crossing the shoreline at the lowest possible safe altitude so that a reliable height reference is maintained to within a few feet of the water surface.

When adequate visual references are not available, make glassy water landings by establishing a stable descent in the landing attitude at a rate that will provide a positive, but not excessive, contact with the water. Recognize the need for this type of landing in ample time to set up the proper final approach. Always perform glassy water landings with power. Perform a normal approach, but prepare as though intending to land at an altitude well above the surface. For example, in a situation where a current altimeter setting is not available and there are few visual cues, this altitude might be 200 feet above the surface. Landing preparation includes completion of the landing checklist and extension of flaps as recommended by the manufacturer. The objective is to have the seaplane ready to contact the water soon after it reaches the target altitude, so at approximately 200 feet above the surface, raise the nose to the attitude normally used for touchdown, and adjust the power to provide a constant descent rate of no more than 150 feet per minute (f.p.m.) at an airspeed approximately 10 knots above stall speed. Maintain this attitude, airspeed, and rate of descent until the seaplane contacts the water. Once the landing attitude and power setting are established, the airspeed and descent rate should remain the same without further adjustment, and the pilot should closely monitor the instruments to maintain this stable glide. Power should only be changed if the airspeed or rate of descent deviate from the desired values. Do not flare, but let the seaplane fly onto the water in the landing attitude. [Figure 6-7]

Upon touchdown, apply gentle back pressure to the elevator control to maintain the same pitch attitude. Close the throttle only after the seaplane is firmly on the water. Three cues provide verification through three different senses—vision, hearing, and body sensation. The pilot sees a slight nose-down pitch at touchdown and perhaps spray thrown to the sides by the floats, hears the sound of the water against the floats, and feels the deceleration force. Accidents have resulted from cutting the power suddenly after the initial touchdown. To the pilot's surprise, a skip had taken place and as the throttle closed, the seaplane was 10 to 15 feet in the air and not on the water, resulting in a stall and substantial damage. Be sure all of the cues

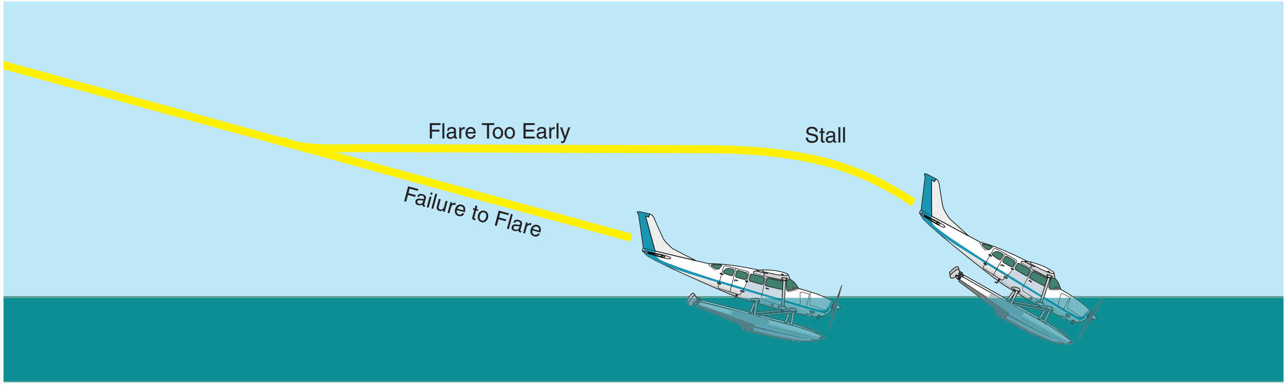

Figure 6-6. The consequences of misjudging altitude over glassy water can be catastrophic.

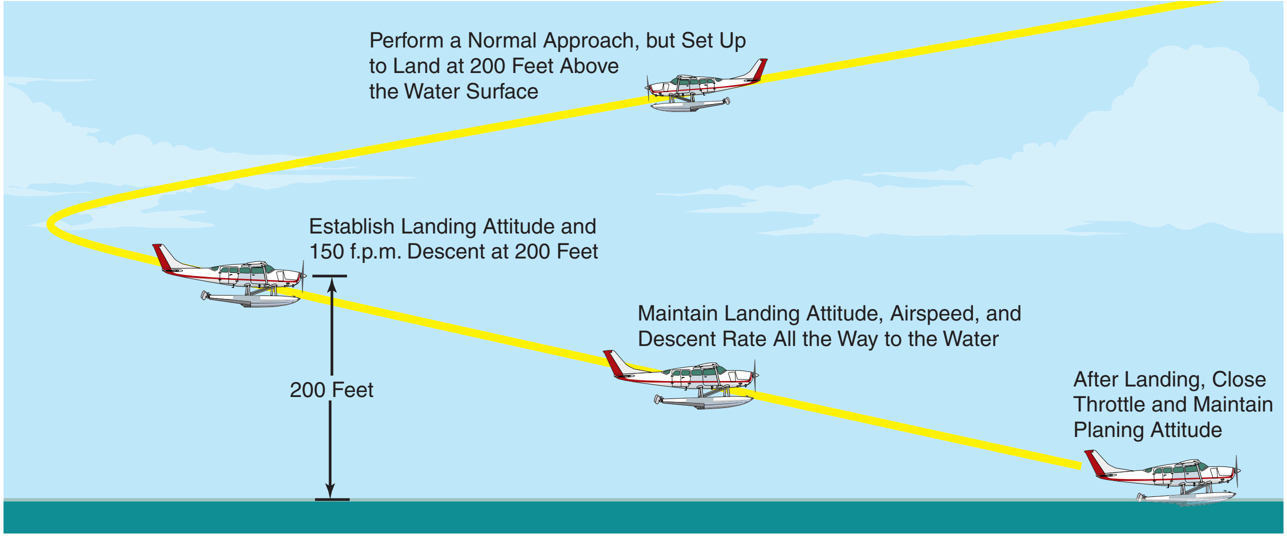

Figure 6-7. Hold the landing attitude, airspeed, and 150 f.p.m. rate of descent all the way to the surface.

indicate that the seaplane is staying on the water before closing the throttle. After the seaplane settles into a displacement taxi, complete the after-landing checklist and lower the water rudders.

An accurately set altimeter may allow the pilot to set up for the touchdown at an altitude somewhat closer to the surface. If the pilot can be certain that the landing configuration and 150 f.p.m. descent will be established well above the water's surface, starting the final glide nearer the surface shortens the descent time and overall landing length.

This technique usually produces a safe, comfortable landing, but the long, shallow glide consumes considerable landing distance. Be certain there is sufficient room for the glide, touchdown, and water run.

ROUGH WATER LANDING

Rough is a very subjective and relative term. Water conditions that cause no difficulty for small boats can be too rough for a seaplane. Likewise, water that poses no challenge to a large seaplane or an experienced pilot may be very dangerous for a smaller seaplane or a less experienced pilot.

Describing a typical or ideal rough water landing procedure is impractical because of the many variables that affect the water's surface. Wind direction and speed must be weighed along with the surface conditions of the water. In most instances, though, make the approach the same as for any other water landing. It may be better, however, to level off just above the water surface and increase the power sufficiently to maintain a rather flat attitude until conditions appear more acceptable, and then reduce the power to touch down. If severe bounces occur, add power and lift off to search for a smoother landing spot.

In general, make the touchdown at a somewhat flatter pitch attitude than usual. This prevents the seaplane from being tossed back into the air at a dangerously low airspeed, and helps the floats to slice through the tops of the waves rather than slamming hard against them. Reduce power as the seaplane settles into the water, and apply back pressure as it comes off the step to keep the float bows from digging into a wave face. If a particularly large wave throws the seaplane into the air before coming off the step, be ready to apply full power to go around.

Avoid downwind landings on rough water or in strong winds. Rough water is usually an indication of strong winds, and vice versa. Although the airspeed for landing is the same, wind velocity added to the seaplane's normal landing speed can result in a much higher groundspeed, imposing excessive stress on the floats, increasing the nose-down tendency at touchdown, and prolonging the water run, since more kinetic energy must be dissipated. As the seaplane slows, the tendency to weathervane may combine with the motion created by the rough surface to create an unstable situation. In strong winds, an upwind landing means a much lower touchdown speed, a shorter water run, and subsequently much less pounding of the floats and airframe.

Likewise, crosswind landings on rough water or in strong winds can leave the seaplane vulnerable to capsizing. The pitching and rolling produced by the water motion increases the likelihood of the wind lifting a wing and flipping the seaplane.

There is additional information on rough water landings in Chapter 8, Emergency Open Sea Operations.

CONFINED AREA LANDING

One of the first concerns when considering a landing in a confined area is whether it is possible to get out