Transportation Safety Board of Canada
Bureau de la sécurité des transports du Canada

REASSESSMENT OF THE RESPONSE TO TSB RECOMMENDATION A93-15

Mandatory seaplane training

Background

Between 1976 and 1990, there were 1,432 seaplane accidents, of which 234 were fatal, resulting in 432 deaths. In February 1994, following an examination of these accidents, the Board issued a report identifying safety deficiencies associated with the levels of skills, abilities and knowledge of pilots engaged in seaplane operations. The report contained ten recommendations addressing issues of training, evaluation and certification, proficiency and education.

On 5 May 1994, the Minister responded to each of the Board's recommendations. Following is the Board's assessment of the extent to which the underlying deficiencies are being addressed.

The Board released Report SSA93001 on 10 February 1994.

TSB Recommendation A93-15 (February 1994)

Presently, for training a pilot to fly seaplanes, it is assumed that the pilot need only be familiarized with the general handling characteristics of that class of aircraft. There are seldom any formal ground school sessions where the principles and practices of seaplane operations are explained, nor is any ground school required by regulations. Yet a pilot must be knowledgeable about a number of different operations and techniques to safely operate such aircraft. For example, knowledge of docking procedures, passenger safety procedures, float and hull design and construction, water leakage and drainage procedures, and proficiency in sailing, docking, glassy water, cross-wind and rough water take-offs and landings, etc.

In view of the frequency of seaplane accidents in which the pilot demonstrated inadequate knowledge of the practices and procedures for reducing the risks in operating seaplanes, or in which the pilot demonstrated inadequate technique or skills for the existing conditions, the Board recommends that

> the Department of Transport consider including mandatory dual flight instruction in glassy water, cross-wind and rough water conditions in the alternate seaplane endorsement flight training syllabi.
>
> **TSB Recommendation A93-15**

Transport Canada's response to Recommendation A93-15 (May 1994)

Transport Canada concurs with the need for instruction in glassy water, cross-wind and rough water conditions. A requirement for mandatory dual flight instruction could, however, result in a lack of continuity in training and an inordinately long wait for applicants to obtain the

alternate seaplane endorsement because varied weather conditions are not always encountered within a reasonable time period. Therefore, in the absence of actual weather conditions and recognizing the need to ensure candidates receive meaningful instruction in these areas, alternative training procedures will be introduced in the flight training syllabus being developed for the alternate seaplane endorsement as a part of the Flight Training Guidance Material Enhancement Project.

TSB assessment of Transport Canada's response to Recommendation A93-15 (July 1994)

The TC reply supports the intent of the recommendation. However, TC believes that a requirement for mandatory dual flight instruction in such water and wind conditions could result in a lack of continuity in training and an inordinately long wait for applicants to obtain their endorsements because the necessary weather conditions might not be encountered within a reasonable time period. In the light of these concerns and recognizing the need for "meaningful instruction" in these areas, TC intends to introduce "alternative training procedures" into the flight training syllabus being developed for the alternate seaplane endorsement.

"Lack of continuity in training" and "inordinately long wait" are questionable assumptions made by TC. Experienced seaplane pilots who conduct seaplane pilot training courses on a regular commercial basis have reported to TSB staff that they have never had any problem finding lakes within short distance from base where they could conduct cross-wind or glassy water training, and they consider such training as an absolute requirement. There is nothing in TC's reply that indicates what such "alternative training procedures" might be, nor what is considered to be "meaningful instruction". The approach to glassy water can, to some extent, be taught in non-glassy water conditions. Unfortunately, informal discussions with TC staff were inconclusive with respect to the prospects for specific "alternative training procedures" for cross-wind and rough water conditions. Therefore, notwithstanding TC's concurrence with the intent of the recommendation, in the absence of specific information on how it will be met, the reply is considered to be **Unsatisfactory.**

TSB reassessment of Recommendation A93-15 (November 1996)

Transport Canada has included an alternate training section in the new training syllabus but has not made it a mandatory requirement.

Therefore, the response to Recommendation A93-15 is assessed as **Satisfactory in Part**.

TSB reassessment of Recommendation A93-15 (November 1997)

No change since the last reassessment.

Therefore the assessment remains as **Satisfactory in Part**.

TSB reassessment of Recommendation A93-15 (January 2004)

While mandatory training in adverse weather conditions was considered impractical, the re-write of TP 12668 (Instructor Guide Seaplane Rating) now requires that as a minimum, these topics be raised during training and if practical, demonstrated and practiced. These changes serve to highlight the topic and partially address the deficiency.

Therefore, the assessment remains as **Satisfactory in Part**.

As such, **Further Action is Unwarranted** with respect to Recommendation A93-15 and the status is set to **Inactive**.

TSB review of Recommendation A93-15 deficiency file status (April 2014)

The Board requested that A93-15 be reviewed to determine if the deficiency file status was appropriate. After an initial evaluation, it was determined that the safety deficiency addressed by Recommendation A93-15 needed to be reassessed.

A request for further information was sent to Transport Canada and a reassessment will be conducted upon receipt of Transport Canada's response.

Therefore, the assessment remains as **Satisfactory in Part**.

Transport Canada's response to Recommendation A93-15 (March 2018)

TC agreed with the recommendation.

In 1996, TC published the Flight Instructor Guide - Seaplane Rating (TP 12668) to contribute to the standardization of seaplane pilot training in Canada.

Part IV of TP 12668 includes the following:

> **Glassy Water Take-off**
>
> *Essential Background Knowledge*
>
> Have the student review normal take-off items.
>
> Discuss depth perception problems on take-off and after lift off.
>
> Describe the difference in float drag compared to a normal water surface — the suction and stickiness associated.
>
> Emphasize that the take-off distance required can be greatly extended and will not be reflected on most take-off performance charts. Therefore, select a take-off path that provides extra distance.
>
> Discuss climb out path considerations — to keep a suitable reference nearby and to avoid a climb out over a large open stretch of water just in case you have an engine problem.
>
> Emphasize how to establish, maintain and confirm a positive rate of climb after lift off.
>
> Explain that, when reducing power after take-off it is important to wait until well clear of the surface.
>
> *Advice to Instructors*
>
> - Every effort should be made to do glassy water training in real glassy water conditions, otherwise the exercise will have to be simulated. Real glassy water conditions are most often found in the early morning or late evening.
>
> *Air Instruction and Student Practice*

Demonstrate and have the student practise glassy water take-offs, including assessing the glassy water situation.

Crosswind Take-off

Essential Background Knowledge

Have the student review normal take-off items.

Have the student review determination of crosswind limitations.

Review reading the water and methods to determine wind intensity, direction and gustiness.

Explain how to minimize the effect of crosswind and how to select the best area for take off and climb out.

Point out similarities to a land plane and the differences. The control limitation on floats is easily reached, especially with a left hand cross wind.

Recognize that the left cross wind component added to the aircraft's natural tendency to yaw left on take off is a substantially greater problem than on a wheel aircraft. This may lead to directional control problems that may exceed the pilot and the aircraft's ability.

Review the aerodynamics and pitch/yaw relationships and methods of enhancing direction control.

Explain how to "roll" afloat on take-off including the timing and technique to be used and compensating for the yaw tendency resulting from the imbalance in float drag.

Explain that the downwind float should be lifted first.

Advice to Instructors

- Plan to retract water rudders on a heading that will result in the desired track by the time the throttle is advanced.
- This exercise can be worked into gradually by altering subsequent take off paths to increase the cross wind angle. Start with a small crosswind.
- Cross winds should be practised with both left and right hand components.
- As with most exercises, if possible, start with a steady light wind.

Air Instruction and Student Practice

Demonstrate and have the student practise crosswind take-offs including assessing the crosswind take-off situation.

Part V of the CARs includes:

Glassy Water Approach and Landing

Essential Background Knowledge

Explain that most seaplanes will dig (pitch down) if landed in a level attitude especially if the water is glassy or only has a slight ripple. The pitch down is more severe if the airplane is loaded near its most forward centre of gravity.

Explain that the surface of glassy water is impossible to see and therefore approaches and landings must be planned alongside a shoreline wherever possible.

Explain that a glassy water landing may take as much as 3 to 4 times the normal distance.

Advice to Instructors

- Have the student hold a constant attitude while decreasing and increasing rate of descent. Use the same technique for touch and go landings — hold a constant attitude throughout, use full power for take-off reduce power to descend, increase power to flatten the descent, all in the landing attitude. This is one of the most important exercises that the student must master.
- No attempt should be made to land on glassy water in the middle of a lake. Always approach and land alongside the shoreline, if at all possible.
- If possible, have students practice flaring at 50 feet more or less above the surface in a light breeze (no turbulence) and practice attitude-power control until touchdown before glassy water is attempted.
- **Every effort should be made to do glassy water training in real glassy water conditions**, otherwise the exercise will have to be simulated. Real glassy water conditions are most often found in the early morning or late evening.
- Simulate the glassy water approach at altitude before attempting one on water.

Instruction and Student Practice

Demonstrate how to assess the glassy water situation.

Demonstrate the glassy water approach and landing, including

- choosing the best approach path
- controlling descent
- cross-checking the shoreline
- touching down
- attitude and power after touchdown

Have the student practise glassy water approaches and landings.

Part VI of the CARs includes:

Rough Water Take-off

Essential Background Knowledge

Have the student review normal take-off items.

Explain how to determine if the take-off area is suitable for take-off without unnecessary stress on the aircraft.

Explain how to determine the best area for take-off and to consider the option of waiting for more favourable conditions.

Review the float hull design and which float attitude best handles large waves.

Review water spray damage on the propeller and how to minimize it by timing the power application for take off.

Discuss the potential for damage on the float structure, braces, airframe, electronics, etc.

Review methods of checking the V brace (if equipped) and float fittings for integrity on the pre-flight inspection.

Advice to Instructors

- The exercise should be covered, however, it is not necessary to do so at the maximum wave intensity. Most of the techniques employed can be effectively covered without finding conditions that test the aircrafts structural integrity. A heavy chop is likely sufficient.

Air Instruction and Student Practice

Demonstrate how to assess the rough water take-off situation.

Demonstrate and have the student practise rough water take-offs.

Rough Water Approach and Landing

Essential Background Knowledge

Explain the range of attitudes in which a safe landing can be accomplished under varying wave heights.

Explain the importance of using a power-assisted approach with half to full flap.

Explain that airspeed should be increased by half the wind speed if turbulence is indicated by “catspaws”.

Explain that touchdown should be made with power on and in the step attitude or only slightly higher.

Explain that landing in a too nose-high attitude will cause the heel of the floats to touch first, slamming the forward portion into the water.

Explain that, once a few wave tops have been touched and the decision is made to complete the landing, power can be reduced and the aircraft held in the level or step attitude by gently applying forward elevator. This causes the float keels to cut the waves and increases drag on the forward float bottoms which decelerates the aircraft.

Explain the importance of avoiding landing in a nose high attitude.

Explain the importance of avoiding up elevator after the power is reduced and the aircraft is decelerating. This will cause the float bottoms to slam into the waves, pounding the aircraft unnecessarily.

Explain the importance of avoiding landing with power off. This reduces control over the sink rate and usually results in a nose high attitude at touchdown. To reject a landing with the power off would usually be as dangerous as remaining on the water.

Explain that, in an emergency such as an engine failure, increase the normal approach speed by as much as 20 knots and use this speed to help control the flare and sink rate. This should be practised on choppy water as most pilots will balloon during the flare on their first few attempts.

Explain that crosswind landings can overstress the float fitting attachment points as the initial wave contact is made on one float. Also, as the aircraft settles off the step (nose high attitude and low airspeed), the aircraft will roll with the waves and the windward wing will be picked up by the wind possibly swamping one float. The ailerons and rudder will be ineffective.

Advice to Instructors

- Since it is often difficult to judge whether the waves are too big until after touchdown, be prepared to reject the landing after touching about 3 to 5 wave tops. This means fairly high power should be carried after first contact with the water and in some aircraft not more than half flap is used. Application of take-off power should cause the aircraft to lift off the water without delay.
- Rough water landings are hard on the aircraft at the best of times. Not only is everything on the aircraft subjected to pounding from the waves but water spray is bound to strike the propeller to some degree. Spray will also be difficult to avoid during displacement taxiing. The fuselage of some aircraft will actually twist while turning in waves.
- Three goals must be met for a safe and efficient rough water landing. First, touch the waves gently in the step attitude or only slightly higher. Second, be prepared and able to reject the landing after touchdown. Third, keep the shock or pounding to a minimum.
- On any landing on rough water try to maintain an attitude that will keep pounding to a minimum. This attitude will vary depending on the size of the seaplane and the size of the floats.

Instruction and Student Practice

Demonstrate how to assess the rough water landing situation.

Demonstrate and have the student practice rough water approaches and landings.

TC plans no further action and suggests closing this recommendation.

TSB reassessment of Transport Canada's response to Recommendation A93-15 (January 2019)

In its response, Transport Canada indicates that the safety deficiency identified in Recommendation A93-15, regarding the inclusion of mandatory dual flight instruction in glassy water, cross-wind and rough water conditions in the seaplane endorsement flight training syllabi, has been addressed as follows:

- In 1996, the *Instructor Guide - Seaplane Rating* (TP 12668) was published. This publication provides flight instructors with the training requirements for a seaplane rating, and includes the items identified in Recommendation A93-15, namely dual flight instruction in glassy water, cross-wind and rough water conditions.

In addition, *Commercial Air Service Standards* section 421.38, *Requirements*, mandates the training of these same items in order to obtain a seaplane rating.

The Board believes that the actions taken by Transport Canada have substantially reduced the risk associated with the safety deficiency identified in Recommendation A93-15.

Therefore, the response to Recommendation A93-15 is assessed as **Fully Satisfactory**.

This deficiency file is **Closed.**