



# IALA MODEL COURSE

L1 3

## AIDS TO NAVIGATION MANAGER TRAINING LEVEL 1 - USE OF THE IALA RISK MANAGEMENT TOOLS

**Edition 2.0**

**December 2015**



# DOCUMENT REVISION

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Revisions to this IALA Document are to be noted in the table prior to the issue of a revised document.

Date	Page / Section Revised	Requirement for Revision
December 2015	Part 1 Part 2	Minor editorial changes Amendments to content based on feedback and experience



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## FOREWORD

The International Association of Marine Aids to Navigation and Lighthouse Authorities (IALA) recognises that training in all aspects of the management of Aids to Navigation (AtoN) service delivery is critical to the consistent provision of that AtoN service.

Taking into account that under the SOLAS Convention, Chapter 5, Regulation 13, paragraph 2, Contracting Governments, mindful of their obligations published by the International Maritime Organisation, undertake to consider the international recommendations and guidelines when establishing aids to navigation, including recommendations on training and qualification of AtoN managers, IALA has adopted Recommendation E-141 Edition 3 on Standards for Training and Certification of AtoN personnel.

IALA Committees working closely with the IALA World Wide Academy (The Academy) have developed a series of model courses for AtoN personnel having E-141 Level 1 management functions. This model course on the use of IALA risk management tools should be read in conjunction with IALA Recommendation E-141/1 – Model Course on Level 1 Manager Training, which contains standard guidance for the conduct of all Level 1 model courses.

This model course is intended to be delivered by The Academy in conjunction with a national member and other appropriate authorities charged with the provision of AtoN services in a particular region. It contains specific guidance on the training of AtoN managers in the use of the IALA Risk Management Toolbox. Assistance in implementing this and other model courses may be obtained from the IALA World Wide Academy at the following address:

The Secretary-General  
IALA  
10 rue des Gaudines  
78100 Saint Germain-en-Laye  
France

Tel: (+) 33 1 34 51 70 01  
Fax: (+) 33 1 34 51 82 05  
e-mail: [academy@iala-aism.org](mailto:academy@iala-aism.org)  
Internet: [www.iala-aism.org](http://www.iala-aism.org)

## PART 1 - COURSE OVERVIEW

### 1. SCOPE

This course is intended to provide aids to navigation managers and other interested parties with the theoretical and practical training necessary to have a satisfactory understanding of the three IALA risk management tools; IALA Waterway Risk Assessment Program (IWRAP Mk2); Port and Waterway Safety Assessment tool (PAWSA) and simulation.

### 2. OBJECTIVE

Upon successful completion of this course, participants will have acquired sufficient knowledge and skill to use IWRAP Mk2 within their organisations; organise a PAWSA workshop and recognise the use to which simulation techniques can be put in risk management and effective AtoN waterway design.

### 3. COURSE OUTLINE

This course is intended to cover the knowledge required for an aids to navigation manager to understand the use of IALA risk management tools within their organisations. The complete course comprises 7 teaching modules with the emphasis placed on the practical use of IWRAP Mk2.

**Table 1** *Teaching modules*

Module Title	Time in hours	Overview
International and Regional Overview	2	This module describes the role of IALA and its publications; the importance of stakeholder liaison and the obligations placed on States under SOLAS Chapter V.
Introduction to the IALA Risk Management Toolbox	2.5	This module describes risk and risk mitigation measures before giving an overview of the three IALA Risk Management Tools: IWRAP Mk2; PAWSA and simulation
IWRAP Mk2	9	This module describes the development, principles and use of IWRAP Mk2 before guiding participants through increasingly complex practical applications based on a specific region
PAWSA	6.5	This module describes the development and use of PAWSA and its 5 Workbooks before demonstrating its use in a regional scenario
Simulation	2.5	This module provides an overview of maritime simulators before showing of simulation techniques can be used in risk management
Complementary use of the IALA Risk Management Toolbox	2	This module describes the interaction between IALA risk management tools in a regional scenario and the human resource and cost implications generated by selected risk mitigation measures
Summary of interaction between Risk Management Tools	1.5	This module uses a panel of experts to review the elements comprising the IALA Risk management toolbox with the aim of consolidating an understanding of how they interact
<b>Total Hours:</b>	<b>26</b>	Five day course



## 4. SPECIFIC COURSE RELATED TEACHING AIDS AND NOTES

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- 1 This course will be classroom based with presentations delivered using MS PowerPoint®. Although the course is limited to 40 participants, the seminar room should be big enough to permit the participants to sit at desks large enough to operate a laptop computer with room for printed material to hand. Each desk should be provided with a power socket.
- 2 The seminar room should be equipped with overhead projectors and screens to enable presentation of the subject matter.
- 3 To enable all participants to receive clear guidance from instructors and to raise questions that can be heard throughout the classroom, lapel or fixed lectern microphones should be provided together with a roving microphone for use by participants.
- 4 IWRAP Mk2 presentations require participants to have Wi-Fi internet access.
- 5 It is expected that each participant will have the use of a personal laptop computer with a Windows OS. As IWRAP Mk2 requires participants to select tools regularly from screen menus, each participant should be advised to use a computer mouse.
- 6 It may be that some participants will have little experience in operating computer models. Consideration should be given to running a two-stream delivery of Module 3 Elements 3.3 – 3.5 to permit participants who are unlikely to use IWRAP Mk2 in practice to gain a satisfactory understanding of its principles without moving to its advanced use.

## 5. PRE-COURSE READING

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Participants should be encouraged to study:

- IALA Recommendation O-134;
- IALA Guideline 1018.

## 6. CERTIFICATION

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Participants who attend all Teaching Modules can be presented with an AtoN Level 1 Manager certificate which states that they have completed successfully the Complementary Module on the IALA Risk Management Toolbox. An example is at Annex A. It should be noted that such a certificate should **not** be considered a formal Certificate of Competence to operate any of the IALA Risk Management Tools without supervision.

## 7. ACRONYMS

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GL	Guideline (IALA)
IALA	International Association of Marine Aids to Navigation and Lighthouse Authorities
IWRAP	IALA Waterways Risk Assessment Program
OS	Operating System
PAWSA	Ports and Waterways Safety Assessment tool
Rec	Recommendation(s) (IALA)
SOLAS	International Convention for the Safety of Life at Sea (SOLAS), 1974 (as amended)
VTS	Vessel Traffic Services
WWA	World Wide Academy (The Academy)



## 8. DEFINITIONS

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The definition of terms used in this Guideline can be found in the International Dictionary of Marine Aids to Navigation (IALA Dictionary) at <http://www.iala-aism.org/wiki/dictionary>

## 9. REFERENCES

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In addition to any specific references required by the Competent Authority, the following material is relevant to this course:

- SOLAS V Chapters 12 and 13;
- IALA Recommendation O-134 on the IALA Risk Management Tool for Ports and Restricted Waterways;
- IALA Guideline 1018 on Risk Management;
- IALA Guideline 1058 on the Use of Simulation as a Tool for Waterway Design and AtoN Planning;
- IALA Guideline 1079 on Establishing and Conducting User Consultancy by AtoN Authorities;
- IWRAP Mk2 Theory Handbook;
- IWRAP Mk2 Exercise Handbook;
- IALA IWRAP Wiki (accessible through the IALA website).



## PART 2 - DELIVERY OF THE MODEL COURSE

### MODULE 1    INTERNATIONAL AND REGIONAL OVERVIEW

#### 1. SCOPE

This module describes the role of IALA and its publications; the importance of stakeholder liaison; the obligations placed on States under SOLAS Chapter V and the maritime situation in the region under consideration.

#### 2. LEARNING OBJECTIVES

To gain a **satisfactory** (Level 2) understanding of the function of IALA and its outputs; a **good** (Level 3) understanding of the obligations set out in SOLAS Chapter V and a **basic** (Level 1) understanding of sources of vessel traffic information and the maritime character of the region under consideration.

#### 3. DETAILED TEACHING SYLLABUS FOR MODULE 1 – INTERNATIONAL AND REGIONAL OVERVIEW

*Table 2 Detailed Teaching Syllabus - Module 1*

Module	Element	Sub-element	Subject	Level of Competence	Recommended training aids and exercises	References Rec = Recommendation GL = Guideline	Lecture No.
<b>1</b>			<b>INTERNATIONAL AND REGIONAL OVERVIEW</b>				
	<b>1.1</b>		<b>Introduction to IALA and International Obligations</b>				
		1.1.1	Introduction to IALA and the IALA World-Wide Academy	2		IALA NAVGUIDE Chapter 1	1
		1.1.2.	Obligations under SOLAS Chapter V 12; 13	3		SOLAS Chapter V	
		1.1.3	IALA Recommendations and Guidelines	2		www.iala-aism.org	
		1.1.4	Stakeholders	1		GL 1079	
	<b>1.2</b>		<b>Regional Overview</b>				
		1.2.1	Maritime overview of the region	1			2



Module	Element	Sub-element	Subject	Level of Competence	Recommended training aids and exercises	References Rec = Recommendation GL = Guideline	Lecture No.
		1.2.2	Regional trends in maritime traffic		IALA-Net inputs		
		1.2.3	Vessel traffic analysis and availability of AIS data			Rec A-126; GL 1082	
		1.2.4	Other sources of maritime traffic information			Rec E-142	
		1.2.5	Availability of regional electronic chart data			GL 1057	
		1.2.6	Introduction to test area under study				

## MODULE 2 INTRODUCTION TO THE IALA RISK MANAGEMENT TOOLBOX

### 1. SCOPE

This module describes risk and risk mitigation measures before giving an overview of the three IALA Risk Management Tools: IWRAP Mk2; PAWSA and simulation.

### 2. LEARNING OBJECTIVES

To gain a **satisfactory** understanding of risk and risk mitigation measures and the composition and function of the IALA risk management toolbox.

### 3. DETAILED TEACHING SYLLABUS FOR MODULE 2 – INTRODUCTION TO THE IALA RISK MANAGEMENT TOOLBOX

*Table 3 Detailed Teaching Syllabus - Module 2*

Module	Element	Sub-element	Subject	Level of Competence	Recommended training aids and exercises	References Rec = Recommendation GL = Guideline	Lecture No.	
2	2.1	<b>INTRODUCTION TO THE IALA RISK MANAGEMENT TOOLBOX</b>						
		<b>Navigational Risk</b>						
		2.1.1	The definition of risk		2		3	
		2.1.2.	Introduction to risk mitigation measures					
		2.1.3	Acceptable levels of risk and impact on mitigation measures					
		2.1.4	Introduction to the IALA risk management toolbox					
		2.1.5	Regional case study of the use of IALA risk management tools					
		2.2	<b>IALA Risk Management Toolbox</b>					
		2.2.1	Mathematical and Delphic models					
		2.2.2	Data required to run quantitative models		2			
		2.2.3	Data required to run qualitative models					
		2.2.4	Comparison between PAWSA and IWRAP Mk2					
	2.3	<b>Regional Case Study</b>						
	2.3.1	Case study of the use of IALA risk management tools						1



		2.3.2	Use of IALA risk management toolbox in national decision making				
	<b>2.4</b>		<b>Simulation in Risk Management</b>				
		2.4.1	The role of simulation in risk analysis	1			5
		2.4.2	Case study of the use of simulation in risk management				

## MODULE 3 IWRAP MK2

### 1. SCOPE

This module describes the development, principles and use of IWRAP Mk2 before guiding participants through increasingly complex practical applications based on a specific region

### 2. LEARNING OBJECTIVES

To gain a **basic** understanding of the theory and development of IWRAP Mk2 and a **satisfactory** hands-on understanding of its use in practice.

### 3. DETAILED TEACHING SYLLABUS FOR MODULE 3 – IWRAP MK2

Table 4 Detailed Teaching Syllabus - Module 3

Module	Element	Sub-element	Subject	Level of Competence	Recommended training aids and exercises	References Rec = Recommendation GL = Guideline	Lecture No.										
3	3.1	IWRAP MK 2															
		Development and Principles															
	3.1.1	Development of IWRAP	1					IWRAPMk2.pdf  IWRAP Theory Handbook (pdf)	6								
	3.1.2	Basic and commercial licences															
	3.1.3	Theory behind the probability model															
	3.1.4	Lateral probability distributions	2														
	3.1.5	Causation factors	1														
	3.2	IWRAP Incident Scenarios															
	3.2.1	Grounding scenarios	2														
	3.2.2	Collision scenarios															
	3.2.3	Area collisions															
	3.3	Creation of an IWRAP Mk 2 Model															
	3.3.1	Introduction to the IWRAP Mk 2 toolbar	1														

Module	Element	Sub-element	Subject	Level of Competence	Recommended training aids and exercises	References Rec = Recommendation GL = Guideline	Lecture No.
		3.3.2	Defining an area to be analysed		Hands on exercises guided by IWRAP presenter	IWRAP Mk2 Exercise Handbook  Note: The IALA World-Wide Academy programme delivers PAWSA (module 4) and simulation (module 5) before practical IWRAP exercises	
		3.3.3	Gathering and inputting maritime traffic data				
		3.3.4	Use and input of electronic chart data				
		3.3.5	Polygon generation				
		3.3.6	Defining and generation of route legs	1	Hands on exercises (continued)		
		3.3.7	Allocation of traffic to legs				
		3.3.8	Baseline analysis				
		3.3.9	Calibration with historical data				
		3.3.10	"What if" analysis				
	<b>3.4</b>		<b>Practical Applications of IWRAP Mk 2</b>				
		3.4.1	Regional example 1 with results	2	Practical exercises	14	
		3.4.2	Regional example 2 with results				
	<b>3.5</b>		<b>Advanced IWRAP Mk 2 modelling</b>				
		3.5.1	Ferry activities	2	Practical exercise with limited supervision	15 16	
		3.5.2	Fishing & leisure craft activities				
		3.5.3	Seasonal variation in traffic volume				
		3.5.4	Day/Night variations in traffic volume				
		3.5.5	One way waterways				

## MODULE 4 PAWSA

### 1. SCOPE

This module describes the development and use of PAWSA and its 5 Workbooks before demonstrating its use in a regional scenario.

### 2. LEARNING OBJECTIVES

To gain a **satisfactory** understanding of the function and use of PAWSA, and a **basic** understanding of the use of Workbooks in a regional scenario.

### 3. DETAILED TEACHING SYLLABUS FOR MODULE 3 – PAWSA

*Table 5 Detailed Teaching Syllabus - Module 4*

Module	Element	Sub-element	Subject	Level of Competence	Recommended training aids and exercises	References Rec = Recommendation GL = Guideline	Lecture No.
4	4.1	PAWSA					
		Development and Principles					
		4.1.1	Development of PAWSA				
		4.1.2	Use of Facilitator, workshop organiser and data entry staff				
		4.1.3	Risk factors				
		4.1.4	Use of experts and stakeholders				
		4.1.5	Balance of stakeholders and waterway users				
		4.1.6	Workbooks and Decision Support Tools				
		4.1.7	Use of Electronic Charts				
		4.1.8	Regional examples of where PAWSA might be used				
4.2	PAWSA Workbooks						
	4.2.1	Book 1 – assessment of team expertise					
	4.2.2	Book 2 - Risk factor rating scales					
	4.2.3	Book 3 – Baseline risk levels					

Module	Element	Sub-element	Subject	Level of Competence	Recommended training aids and exercises	References Rec = Recommendation GL = Guideline	Lecture No.
		4.2.4	Book 4 – Effectiveness of mitigation measures				
		4.2.5	Book 5 – Additional mitigation measures				
		4.2.6	Workshop report				
	<b>4.3</b>		<b>PAWSA Test Cases using a Regional Port (1)</b>				
		4.3.1	Selection of experts	1	Four teams of 2 experts to be selected from participants. Guided practical exercises		9
		4.3.2	Sources of hydrological and vessel traffic data				
		4.3.3	Practical exercise Book 1				
		4.3.4	Experts review of the test port				
		4.3.5	Practical exercise Books 2 and 3				
	<b>4.4</b>		<b>PAWSA Test Cases using a regional Port (2)</b>				
		4.4.1	Review of migration measures – scoring Book 4	1	Guided review of Books 4 and 5		10
		4.4.2	Cost effectiveness of selected mitigation measures				
		4.4.3	Summary of additional interventions – Book 5				
		4.4.4	Review of Test Case				



## MODULE 5 SIMULATION

### 1. SCOPE

This module describes the use of simulators for the investigation of risk for specific ship applications and waterway design including modelling various AtoN within that waterway and other risk mitigation factors.

### 2. LEARNING OBJECTIVES

To gain a **satisfactory** understanding of the function and use of simulation techniques in risk management and a **basic** understanding how simulation can be used in the effective design of waterways.

### 3. DETAILED TEACHING SYLLABUS FOR MODULE 5 – SIMULATION

*Table 6 Detailed Teaching Syllabus - Module 5*

Module	Element	Sub-element	Subject	Level of Competence	Recommended training aids and exercises	References Rec = Recommendation GL = Guideline	Lecture No.
5	5.1		<b>MARITIME SIMULATION</b>				
			<b>Overview of Maritime Simulators, Simulation Techniques &amp; Application Area</b>				
		5.1.1	Definition and application area of simulation	2		Rec O-138	11
		5.1.2	Types of simulators and modes of simulation			GL-1058	
		5.1.3	Classes of simulators and classification /standards			DNV Standard 214	
	5.2		<b>Elements of Maritime Simulation and Modelling</b>				
		5.2.1	Modelling of ships motion & forces for manoeuvring characteristics	1			12
		5.2.2	Modelling of environment and AtoN				
	5.3		<b>Samples for Application of Maritime Simulation</b>				
		5.3.1	Simulation for specific investigations (lights, AtoN)			GL 1078, GL 1069	
		5.3.2	Simulation for regional port and waterway design	DNV Standard 307			



Module	Element	Sub-element	Subject	Level of Competence	Recommended training aids and exercises	References Rec = Recommendation GL = Guideline	Lecture No.
		5.3.3	Scenario design and analysis of results				

## MODULE 6 COMPLEMENTARY USE OF THE IALA RISK MANAGEMENT TOOLBOX

### 1. SCOPE

This module describes the interaction between IALA risk management tools in a regional scenario and the human resource and cost implications generated by selected risk mitigation measures.

### 2. LEARNING OBJECTIVES

To reinforce a **good** understanding of the obligations on Competent Authorities and a **satisfactory** understanding of risk and mitigation measures. To gain a **satisfactory** understanding of the how the three IALA risk management tools can be used in a specific region and a **basic** understanding of the concept of Sea Traffic Management and the cost implications that might result from adopting selected risk mitigation measures.

### 3. DETAILED TEACHING SYLLABUS FOR MODULE 6 – COMPLEMENTARY USE OF THE IALA RISK MANAGEMENT TOOLBOX

*Table 7 Detailed Teaching Syllabus - Module 6*

Module	Element	Sub-element	Subject	Level of Competence	Recommended training aids and exercises	References Rec = Recommendation GL = Guideline	Lecture No.	
6	6.1		<b>COMPLEMENTARY USE OF THE IALA RISK MANAGEMENT TOOLBOX</b>					
			<b>Review of Current and Future Risk Management</b>					
		6.1.1	Review of obligations on Competent Authorities	3	Film of a concept of Sea Traffic Management	Rec O-139	17	
		6.1.2.	Review of risk and mitigation measures	2				
		6.1.3	Concept of Sea Traffic Management	1				
		6.2		<b>Regional case study of the use of Risk Management Tools</b>				
			6.2.1	Use of IWRAP to determine change in risk	2	Visit to VTS centre and/or Port operations	Rec O-139	18
			6.2.2	Use of PAWSA to determine change in risk				
			6.2.3	Review of identified change in risk				
			6.2.4	Risk mitigation measures				



Module	Element	Sub-element	Subject	Level of Competence	Recommended training aids and exercises	References Rec = Recommendation GL = Guideline	Lecture No.
		6.2.5	Qualitative Risk Assessment				

## MODULE 7    DISCUSSION ON THE IALA RISK MANAGEMENT TOOLBOX

### 1. SCOPE

This module uses a panel of experts to review the elements comprising the IALA Risk management toolbox with the aim of consolidating an understanding of how they interact Learning Objectives.

### 2. LEARNING OBJECTIVES

To reinforce a **satisfactory** understanding of the sequence in which components of the IALA Risk Management Toolbox might be used regionally.

### 3. DETAILED TEACHING SYLLABUS FOR MODULE 3 – PANEL DISCUSSION ON THE IALA RISK MANAGEMENT TOOLBOX

*Table 8 Detailed Teaching Syllabus - Module 7*

Module	Element	Sub-element	Subject	Level of Competence	Recommended training aids and exercises	References Rec = Recommendation GL = Guideline	Lecture No.
7			<b>DISCUSSION ON THE IALA RISK MANAGEMENT TOOLBOX</b>				
	7.1		<b>Summary of interaction between Risk Management Tools</b>				
		7.1.1	Sequence of use of IALA risk Management Tools	2	Discussion led by panel of experts		19
		7.1.2	Regional review: future use of the IALA Risk Management Toolbox				