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Exhibit R-2, RDT&E Budget Item Justification: PB 2022 Navy **Date:** May 2021

Appropriation/Budget Activity 1319: <i>Research, Development, Test & Evaluation, Navy / BA 4: Advanced Component Development & Prototypes (ACD&P)</i>					R-1 Program Element (Number/Name) PE 0604031N / <i>Large Unmanned Undersea Vehicles</i>							
COST (\$ in Millions)	Prior Years	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	FY 2023	FY 2024	FY 2025	FY 2026	Cost To Complete	Total Cost
Total Program Element	81.604	66.664	62.209	88.063	-	88.063	-	-	-	-	-	-
2094: <i>Unmanned Underwater Vehicle</i>	81.604	66.664	62.209	88.063	-	88.063	-	-	-	-	-	-

A. Mission Description and Budget Item Justification

The Snakehead Large Displacement Unmanned Undersea Vehicle (LDUUV) is the Navy's Large UUV effort as part of the Family of UUVs, in support of maintaining the Navy's undersea superiority. It is the Navy's largest Submarine-launched UUV, providing increased endurance, depth capability, and payload capacity beyond small and medium class submarine deployed UUVs. The Snakehead LDUUV will be modular in design and include high accuracy mission sensors and communications links, as well as modular payload capabilities. It is intended that modules will have well defined interfaces for the purposes of implementing cost-effective upgrades in future increments to leverage advances in technology.

The Snakehead LDUUV program is a CNO/ASN(RDA) approved Accelerated Acquisition, featuring a phased approach to grow capabilities at a manageable level of risk. Phase 1 is a Government developed prototype with significant Industry involvement to develop Techniques, Tactics, and Procedures (TTPs), Concepts of Operation (CONOPS), and risk reductions for submarine integration. One Phase 1 vehicle, with sufficient test spares, will be fabricated for integration onto Dry Deck Shelter (DDS) equipped submarines with subsystem testing commencing in FY21 and vehicle in-water testing in FY22. Phase 2 is a competitive award to Industry, with increased capabilities and integration onto Modernized DDS, as well as potential integration onto surface ships. In order to support this accelerated transition to Industry, a Phase 1 Technical Data Package and a draft RFP were shared with Industry, culminating with a competitive Request for Proposal (RFP) release in Q1FY21. An award to industry will occur in FY22 for a single vendor design with options to fabricate and test prototype vehicles followed by delivery to the Fleet for demonstration and fielding.

B. Program Change Summary (\$ in Millions)	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total
Previous President's Budget	68.310	78.122	88.435	-	88.435
Current President's Budget	66.664	62.209	88.063	-	88.063
Total Adjustments	-1.646	-15.913	-0.372	-	-0.372
• Congressional General Reductions	-	-0.348			
• Congressional Directed Reductions	-	-15.565			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-	-			
• SBIR/STTR Transfer	-1.646	0.000			
• Rate/Misc Adjustments	0.000	0.000	-0.372	-	-0.372

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Appropriation/Budget Activity 1319: <i>Research, Development, Test & Evaluation, Navy / BA 4: Advanced Component Development & Prototypes (ACD&P)</i>	R-1 Program Element (Number/Name) PE 0604031N / <i>Large Unmanned Undersea Vehicles</i>	
<u>Change Summary Explanation</u> Program Changes: FY20: -\$1,646K Small Business Innovative Research (SBIR) FY21: -\$15,565K Congressional Directed Reductions: Contract award early to need; -348K Undistributed reduction FY22: -\$372K Rate/Misc adjustments Technical: Not applicable. Schedule: Not applicable.		

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Exhibit R-2A, RDT&E Project Justification: PB 2022 Navy										Date: May 2021		
Appropriation/Budget Activity 1319 / 4					R-1 Program Element (Number/Name) PE 0604031N / Large Unmanned Undersea Vehicles				Project (Number/Name) 2094 / Unmanned Underwater Vehicle			
COST (\$ in Millions)	Prior Years	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	FY 2023	FY 2024	FY 2025	FY 2026	Cost To Complete	Total Cost
2094: Unmanned Underwater Vehicle	81.604	66.664	62.209	88.063	-	88.063	-	-	-	-	-	-
Quantity of RDT&E Articles		-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

The Snakehead Large Displacement Unmanned Undersea Vehicle (LDUUV) is the Navy's Large UUV effort as part of the Family of UUVs, in support of maintaining the Navy's undersea superiority. It is the Navy's largest Submarine-launched UUV, providing increased endurance, depth capability, and payload capacity beyond small and medium class submarine deployed UUVs. The Snakehead LDUUV will be modular in design and include high accuracy mission sensors and communications links, as well as modular payload capabilities. It is intended that modules will have well defined interfaces for the purposes of implementing cost-effective upgrades in future increments to leverage advances in technology. The Snakehead program is a CNO/ASN(RDA) approved Accelerated Acquisition, featuring a phased approach to build capabilities at a manageable level of risk in the Navy's class of Large Displacement Unmanned Undersea Vehicles.

B. Accomplishments/Planned Programs (\$ in Millions, Article Quantities in Each)

	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total
Title: LDUUV Product Development	61.606	51.705	69.503	0.000	69.503
Articles:	-	-	-	-	-
FY 2021 Plans: Complete Phase 1 vehicle fabrication and commence system level testing to characterize and assess Phase 1 submarine certification, risk reduction and battery integration. Incorporate hardware and software engineering changes for Phase 1 vehicle during testing. Continue submarine integration certification, risk reduction and battery integration efforts. Release of RFP to industry.					
FY 2022 Base Plans: Perform Phase 1 Government testing and host submarine integration efforts, sharing technical data and lessons learned with Industry. Complete source selection process and award Phase 2 contract in 1QFY22.					
FY 2022 OCO Plans: N/A					
FY 2021 to FY 2022 Increase/Decrease Statement: Increase of +\$17.798M to account for the initiation of Industry Phase design.					
Title: LDUUV Support	2.644	2.804	6.130	0.000	6.130
Articles:	-	-	-	-	-

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Appropriation/Budget Activity 1319 / 4	R-1 Program Element (Number/Name) PE 0604031N / <i>Large Unmanned Undersea Vehicles</i>	Project (Number/Name) 2094 / <i>Unmanned Underwater Vehicle</i>

B. Accomplishments/Planned Programs (\$ in Millions, Article Quantities in Each)	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total
<p>Provide program management support and travel for the LDUUV program. Manage concurrent Phase 1 vehicle testing and industry contract award. Program management plans include overall technical guidance and leadership of the program. Oversight of financial and logistics efforts and coordination with Navy and other DoD organizations and contractors as required to ensure successful execution of the program.</p> <p>FY 2022 Base Plans: Provide program management support and travel for the LDUUV program. Manage Phase 1 in-water test execution and fleet demonstrations. Manage Phase 2 contract execution. Program management plans include overall technical guidance and leadership of the program. Oversight of financial and logistics efforts and coordination with Navy and other DoD organizations and contractors as required to ensure successful execution of the program.</p> <p>FY 2022 OCO Plans: N/A</p> <p>FY 2021 to FY 2022 Increase/Decrease Statement: Increase of +0.186M for management services and travel costs.</p>					
Accomplishments/Planned Programs Subtotals	66.664	62.209	88.063	0.000	88.063

C. Other Program Funding Summary (\$ in Millions)											
Line Item	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	FY 2023	FY 2024	FY 2025	FY 2026	Cost To Complete	Total Cost
• OPN/1612: <i>Large UUV</i>	0.000	0.000	0.000	-	0.000	-	-	-	-	-	-

Remarks

D. Acquisition Strategy
Snakehead LDUUV is a multi-phased effort to design, build, and test a risk-reduction UUV followed by competitive award of a design and fabrication contract to Industry. Phase 1 is a single Government developed prototype with significant Industry involvement to develop Techniques, Tactics, and Procedures (TTP) and Concepts of Operation (CONOPS) and reduce risk for submarine integration. The Navy shared a Phase 1 Technical Data Package with Industry. Phase 2 is an accelerated acquisition effort using USC Sec 2358 authorities. A competitive Request for Proposal (RFP) was released in Q1 FY21 and a contract award is planned in early FY22 for a single vendor design with options to fabricate and test prototype vehicles, followed by delivery to the Fleet for acceptance testing, demonstration and fielding. Results from LDUUV Phases 1 and 2 may inform the decision to transition to an Acquisition Category (ACAT) Program as early as FY25.

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2022 Navy **Date:** May 2021

Appropriation/Budget Activity 1319 / 4	R-1 Program Element (Number/Name) PE 0604031N / Large Unmanned Undersea Vehicles	Project (Number/Name) 2094 / Unmanned Underwater Vehicle
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Product Development (\$ in Millions)				FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
LDUUV Industry Vehicle Design	C/CPHF	TBD : TBD	0.000	0.000		2.530	Nov 2021	28.550	Nov 2021	-		28.550	-	-	-
LDUUV Vehicles, Hardware, & Design	WR	NUWC Newport : Newport, RI	25.256	20.004	Dec 2019	12.500	Nov 2020	17.338	Nov 2021	-		17.338	-	-	-
LDUUV Vehicles, Hardware, & Design	C/CPFF	Various : Various	17.565	17.589	Dec 2019	10.448	Oct 2020	1.974	Oct 2021	-		1.974	-	-	-
LDUUV Vehicles, Hardware, & Design	WR	NSWC Carderock : West Bethesda, MD	9.155	6.535	Dec 2019	5.423	Nov 2020	3.600	Nov 2021	-		3.600	-	-	-
LDUUV Vehicles, Hardware, & Design	WR	NSWC Panama City : Panama City, FL	0.166	0.000		0.000		0.000		-		0.000	-	-	-
LDUUV Vehicles, Hardware, & Design	SS/CPFF	ARL PSU : State College, PA	11.975	10.802	Jan 2020	8.200	Dec 2020	3.088	Dec 2021	-		3.088	-	-	-
LDUUV Vehicles, Hardware, & Design	WR	SSC Pacific : San Diego, CA	0.729	0.306	Dec 2019	0.954	Oct 2020	0.650	Oct 2021	-		0.650	-	-	-
LDUUV Vehicles, Hardware, & Design	WR	NUWC Keyport : Keyport, WA	6.376	6.270	Dec 2019	4.060	Nov 2020	8.165	Nov 2021	-		8.165	-	-	-
LDUUV Experimentation and Risk Reduction - Battery Certification	WR	NSWC Crane : Crane, IN	0.313	0.100	Dec 2019	1.940	Nov 2020	2.780	Nov 2021	-		2.780	-	-	-
LDUUV Platform Integration	Various	Various : Various	0.865	0.000		5.650	Feb 2021	3.358	Feb 2022	-		3.358	-	-	-
LDUUV Risk Reduction Sonar	SS/CPFF	ARL UT : Austin, TX	0.551	0.000		0.000		0.000		-		0.000	-	-	-
Subtotal			72.951	61.606		51.705		69.503		-		69.503	-	-	N/A

Support (\$ in Millions)				FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
LDUUV Engineering Support	WR	NUWC Newport : Newport, RI	1.891	0.345	Dec 2019	0.400	Nov 2020	1.300	Nov 2021	-		1.300	-	-	-

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Appropriation/Budget Activity				R-1 Program Element (Number/Name)				Project (Number/Name)							
1319 / 4				PE 0604031N / Large Unmanned Undersea Vehicles				2094 / Unmanned Underwater Vehicle							
Support (\$ in Millions)				FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total			
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract
LDUUV Launch and Recovery Engineering Support	WR	NSWC Panama City : Panama City, FL	0.306	0.000		0.000		0.000		-		0.000	-	-	-
LDUUV Hydrodynamics and Propulsion Engineering Support	C/CPFF	Various : Various	0.582	0.132	Dec 2019	0.132	Nov 2020	1.255	Nov 2021	-		1.255	-	-	-
LDUUV Hull and Propulsion Engineering Support	WR	NSWC Carderock : West Bethesda, MD	1.178	0.971	Dec 2019	0.972	Nov 2020	1.125	Nov 2021	-		1.125	-	-	-
LDUUV Command and Control Engineering Support	WR	SSC Pacific : San Diego, CA	0.569	0.361	Dec 2019	0.450	Dec 2020	0.870	Dec 2021	-		0.870	-	-	-
LDUUV Engineering Support	SS/CPFF	APL/JHU : Laurel, MD	0.435	0.600	Jan 2020	0.600	Jan 2021	1.130	Jan 2022	-		1.130	-	-	-
LDUUV ILS and Engineering Support	WR	NUWC Keyport : Keyport, WA	0.173	0.235	Dec 2019	0.250	Nov 2020	0.450	Nov 2021	-		0.450	-	-	-
Subtotal			5.134	2.644		2.804		6.130		-		6.130	-	-	N/A
Test and Evaluation (\$ in Millions)				FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total			
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract
FLEET Experimentation	WR	NUWC NPT : Newport, RI	0.000	0.000		4.092	Dec 2020	7.336	Dec 2021	-		7.336	-	-	-
FLEET Experimentation	SS/CPFF	ARL PSU : State College, PA	0.000	0.000		0.000		1.250	Jan 2022	-		1.250	-	-	-
FLEET Experimentation	Various	Various : Various	0.000	0.000		0.950	Oct 2020	1.000	Oct 2021	-		1.000	-	-	-
Subtotal			0.000	0.000		5.042		9.586		-		9.586	-	-	N/A

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Exhibit R-4, RDT&E Schedule Profile: PB 2022 Navy **Date: May 2021**

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LDUUV	FY 2020				FY 2021				FY 2022			
	1Q	2Q	3Q	4Q	1Q	2Q	3Q	4Q	1Q	2Q	3Q	4Q
LDUUV Development	Experimentation Risk Reduction and TRL Maturation											
Experimentation Risk Reduction	Experimentation Risk Reduction and TRL Maturation											
Design Reviews	<div style="display: flex; justify-content: space-between;"> TDP Review ▲ Phase 1 TRR ▲ Industry Design PDR ▲ </div>											
Phase 1	Cont'd LLTM & Fabrication											
Long Lead Material & Fabrication	Cont'd LLTM & Fabrication											
Government Testing	Testing											
Correction of Deficiencies (CoD) and Submarine Integration	Testing											
Fleet Demonstrations, TTP Development	Testing											
Phase 2	TDP Development											
Technical Data Package Development	TDP Development											
RFP Development	RFP Development											
RFP Release	RFP ▲											
Source Selection	Source Selection											
Contract Award	Contract Award ▲											
Industry Design and Fabrication	Design and Fabrication											
Testing	Design and Fabrication											
Correction of Deficiencies (CoD) and Submarine Integration	Design and Fabrication											
Operations and Sustainment	Design and Fabrication											
LDUUV Production	Design and Fabrication											

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Exhibit R-4A, RDT&E Schedule Details: PB 2022 Navy		Date: May 2021
Appropriation/Budget Activity 1319 / 4	R-1 Program Element (Number/Name) PE 0604031N / <i>Large Unmanned Undersea Vehicles</i>	Project (Number/Name) 2094 / <i>Unmanned Underwater Vehicle</i>

Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
LDUUV				
LDUUV Development: Experimentation Risk Reduction:	1	2020	4	2022
Design Reviews: Phase 1 Test Readiness Review	1	2022	1	2022
Design Reviews: TDP Review	2	2020	2	2020
Design Reviews: Industry Design PDR	4	2022	4	2022
Phase 1: Long Lead Material & Fabrication:	1	2020	4	2021
Phase 1: Government Testing:	1	2022	4	2022
Phase 2: Technical Data Package Development:	1	2020	2	2020
Phase 2: RFP Development:	1	2020	4	2020
Phase 2: RFP Release:	1	2021	1	2021
Phase 2: Source Selection:	3	2021	1	2022
Phase 2: Contract Award:	1	2022	1	2022
Phase 2: Industry Design and Fabrication:	1	2022	4	2022